

Analysis of Undesignated Work

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Abstract

The Navy consists of designated and undesignated work requirements. Over time, this mix fluctuates, causing changes to the force profile. Undesignated workload has decreased as Navy policy and manning constructs have changed. The accepted undesignated work requirement is 3 percent of the enlisted workload; however, it could be as high as 27 percent. This wide range causes significant changes in billet requirements as the Navy establishes and reviews ship/squadron manning documents during the Manpower Requirements Determination (MRD) process. Changing requirements cause fluctuations in demand signals for undesignated sailors and have resulted in fleet manning issues, which are exacerbated by the Navy's use of the undesignated work program as an endstrength "safety valve" to balance its manpower accounts. A review of alternative management approaches for the undesignated workforce found that, despite issues with the Professional Apprenticeship Career Track (PACT) program, it is an improvement over past programs. Although PACT sailors do not produce enough undesignated work to meet requirements, improvements in the program and its execution could garner increased undesignated work production. Going forward, the Navy should look to improve program execution, tighten controls within the MRD process, and stabilize the demand.

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Executive Summary

The Navy has traditionally consisted of designated and undesignated work requirements. Over time, the mix of this designated and undesignated work has fluctuated, causing changes to the force profile of the sailors required to perform the work. Looking forward, changes in Navy policy, budgetary constraints, available workforce, technology, and ship design may further evolve this mix of labor. Understanding the demand and mix of designated and undesignated work is critical to long-term force planning.

Our review of the Navy's undesignated work shows that undesignated work is—and always has been—part of the Navy's workload. There continues to be disagreement on just how much undesignated work exists. Using the Navy's occupational standards, this work requirement could be as high as 27 percent of the Navy's entire enlisted work requirement. However, the Navy deviates from its occupational standards when distributing undesignated work during the Manpower Requirements Determination (MRD) process, which results in undesignated Billets Authorized (BA) equal to about 3 percent of the enlisted workload.

During the MRD process, undesignated work is distributed between undesignated and rated requirements. The amount of work distributed to each fluctuates based on changes in policy, leadership direction, Navy Requirements Management System processes, and MRD inputs. A review of the MRD process showed that too many constituents can bring about changes to this distribution ratio, affecting the undesignated work requirements assigned to the undesignated work program (General Detail (GENDET)/Professional Apprenticeship Career Track (PACT)). As a result, Enlisted Program Authorizations (EPA) and BA continue to fluctuate. This means Navy planners are in a continual EPA chase, which often results in manning overages and/or shortfalls as accession plans shoot behind the unplanned increase or decrease in EPA and/or BA. Furthermore, the Navy has used these programs as an endstrength “safety valve.” This safety valve has value to Navy budgetary planners but leads to manning challenges afloat. The Navy needs to decide if the manning risk to the fleet in undesignated work requirements is an acceptable outcome of using this program as a safety valve.

These changes create instability in the program demand and make future forecasts difficult; therefore, it is recommended that the Navy tighten the MRD process, set ceilings and floors for PACT planning, and put in place controls to prevent

requirements (REQ) and BA creep. Type Commanders should work with the Navy Manpower Analysis Center to set specific undesignated work ceilings and floors for ship classes and squadrons.

A review of past and present undesignated workforce programs found that, regardless of which undesignated work program was in effect, the same problems were perceived by the fleet and Navy personnel. The three main problems areas are:

- Manning issues
- Poor program execution
- Burden to fleet

Over the years, the Navy implemented various changes and improvements to address these problem areas, but it later reversed many of them due to shifting Navy policies and agendas. More often than not, the Navy had correctly identified the key issues and the best solutions but failed to give appropriate time for the changes to take effect.

Through our analysis of the costs and effectiveness of the undesignated work programs, we found that, strictly on the basis of cost per time worked, PACT sailors are more cost-effective than A-school recruits for the same ratings. One consideration is that PACT sailors produce the majority of their work in ratings rather than undesignated jobs. So, while they may be cost-effective in producing more months of total work, there may be significant requirements for undesignated work that remain to be filled. Unless more PACT sailors are recruited, or PACTs perform undesignated work longer, some portion of undesignated work requirements would be met by rated sailors in any case.

This can be attributed in part to actual program execution; sailors have been rating more quickly than planned, and planners have not matched actual rating time and refresh rates. We found during our analysis that, regardless of the program, undesignated sailors normally rate at 14 months. However, the Navy's undesignated work management programs set refresh metrics to 24 months. Realizing that this resulted in an undesignated work-to-labor-force gap, the Navy recently reset the refresh metric to 18 months. This still results in a mismatch and allows for shortfalls in the PACT inventory. The Navy hopes to mitigate this mismatch by using PACT rating levers—reducing rating entry designation (RED) quotas and increasing Navy Wide Advancement Exam and A-school quotas, which result in increased PACT time.

In our analysis, we found that very few GENDETs or PACTs appear to be attending A-school, and that percentage has decreased to less than 10 percent since the PACT program was implemented. Because most PACTs enter ratings that do not require an A-school, this is seen by the Navy as a positive trend and a cost savings. It is unclear if a readiness decrement occurs in the fleet due to the lack of formalized training for

these sailors. As the Navy moves toward Ready Relevant Learning, the PACT program could be used to assess the effectiveness of delayed rate training and any impacts to readiness.

Increasing the number of PACT sailors appears desirable in the macro cost-effectiveness sense, but our analysis finds that PACTs and GENDETs do not necessarily produce as much undesignated work as billet manning may desire. The recent change to the PACT program, setting a minimum time on board (TOB), may increase the amount of undesignated work produced; however, this change was not tested in our models. We recommend that the Navy develop an optimization model to determine the optimal TOB minimum to produce maximum unrated work, using the PACT program levers as input variables under the current PACT program parameter of a 24-month PACT limit.

In our optimization model, we examined a 4-year enlistment for airman PACT (A-PACT) sailors accessed as E1s, holding these sailors as A-PACT throughout their entire first enlistment. We used these criteria to mirror those in the proposed Naval Aviation Enterprise Optimized Fleet Response Plan A-PACT pilot. It is intuitive that rated sailors are more expensive than A-PACT sailors prior to their reenlistment due to higher recruitment and training costs. This implies that, to minimize cost, undesignated work should be performed by A-PACT sailors. However, if A-PACT sailors' subsequent reenlistment is suppressed, it may be better to have rated sailors performing this undesignated work to ensure that future billet demand is satisfied at reenlistment. While the A-PACT sailors will satisfy the undesignated work demand, the Navy incurs the recruitment, training, and deployed cost of A-PACT sailors without the benefit of those sailors satisfying future demand (E4 and above). This future demand will need to be met by recruiting more rated sailors who come with a steeper price tag. Therefore, our analysis found that it is in the best interest of the Navy to have A-PACT sailors perform undesignated work while allowing those sailors to reenlist in the Navy to satisfy the future demand for rated work.

In conclusion, even though the undesignated workload requirement has decreased as Navy policy and manning constructs have changed, it remains a key part of the Navy's workload. Although there are still issues with the program, PACT is an improvement over past programs. PACT sailors provide the Navy with a reliable workforce at a reduced cost from their rated counterparts. Improvements in the program and its execution could garner increased undesignated work production of PACT sailors. Going forward, the Navy should look to improve program execution, tighten controls within the MRD process, and stabilize the demand. Once these issues are addressed, the Navy could consider exploiting PACT cost-effectiveness by expanding the program.

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Glossary

AFQT	Armed Forces Qualification Test
AMD	Ship Activity Manning Document
AN	Airman
A-PACT	Airman Professional Apprentice Career Track
ASVAB	Armed Services Vocational Aptitude Battery
BA	Billets Authorized
BCR	Billet Change Requests
BMR	Basic Military Requirements
BSO	Budget Submitting Office
CCC	Command Career Counselor
CM	Corrective Maintenance
CNAF	Commander, Naval Air Forces (COMNAVAIRFOR)
CNP	Chief of Naval Personnel
CNSF	Commander, Naval Surface Forces (COMNAVSURFOR)
CREO	Career Reenlistment Objective
CS	Culinary Specialist
EC	Enriched Culture
ECM	Enlisted Community Manager
EMC	Enlisted Management Community
EMC	Enlisted Management Code
EMF	Enlisted Master File
EPA	Enlisted Program Authorization
E-PACT	Fireman Professional Apprentice Career Track
FM	Facilities Maintenance
FN	Fireman
FYDP	Future Years Defense Plan
GENDET	General Detail
GTEP	GENDET Targeted Enlisted Program
HSDG	High School Diploma Graduate
LCS	Littoral Combat Ship
MAP	Master Air Plan
MPTE	Manpower, Personnel, Training, and Education
MRD	Manpower Requirements Determination
NAE	Naval Aviation Enterprise
NALCOMIS	Naval Aviation Logistics Command Management Information System
NAMP	Naval Aviation Maintenance Program

NAVMAC	Navy Manpower and Analysis Command
NCS	National Call to Service
NEC	Navy Enlisted Classification
NEOCS	Navy Enlisted Occupational Classification System
NETC	Naval Education and Training Center
NRMS	Navy Requirements Management System
NWAE	Navy Wide Advancement Exam
OEF	Operation Enduring Freedom
OFRP	Optimized Fleet Response Plan
OIF	Operation Iraqi Freedom
OJT	On-the-Job Training
OPNAV	Operations Navy
ORD	Operational Requirements Documents
OUS	Own Unit Support
PACT	Professional Apprenticeship Career Track Program
PBIS	Program Budget Information System
PDT	Paygrade Distribution Table
PM	Planned Maintenance
POE	Projected Operational Environment
PPB&E	Programming, Planning, Budgeting and Execution
PQS	Personnel Qualification Standards
PSI	Programmed School Input
PSM	Personnel System Modernization
RED	Rating Entry Designation
ROC	Required Operational Capability
RRL	Ready Relevant Learning
RS	Resource Sponsor
RTC	Recruit Training Command
SG	School Guarantee
SMD/SQMD	Ship Manning Document/Squadron Manning Document
SME	Subject Matter Expert
SN	Seaman
S-PACT	Seaman Professional Apprentice Career Track
TASP	Targeted A-School Program
TFMMS	Total Force Manpower Management System
TIG	Time in Grade
TIR	Time in Rating
TOB	Time on Board
TYCOM	Type Commander
UI	Under Instruction
YG	Year Group
YOS	Years of Service

Introduction

The Navy has traditionally consisted of designated and undesignated work requirements. Over time, the mix of this designated and undesignated work has fluctuated, causing changes to the force profile of the sailors required to perform the work. Looking forward, changes in Navy policy, available workforce, technology, and ship design may lead to further evolution of this mix of labor. Understanding the mix of designated and undesignated work is critical to long-term force planning.

Navy sailors perform their duties in both designated and undesignated billets. Designated sailors predominately fill rated or designated billets—billets that are classified into one of the enlisted management communities that belong to a specific rating and require training beyond bootcamp. Undesignated sailors are assigned to undesignated billets—billets that do not belong to any rating or require any additional training—and are classified as airmen, seamen, or firemen. Over time, as the mix of the designated and undesignated work requirements has changed, so has the number of the undesignated sailors the Navy requires.

Background

In the past, the Navy relied on the General Detail (GENDET) program to provide sailors to perform this “undesignated work.” The GENDET program allowed the Navy flexibility in filling workforce gaps the traditional accession contract or School Guarantee (SG) program may have not manned effectively. In October 2005, however, Navy leadership made a commitment to invest up front in its people by providing all future sailors with formal school training as part of their naval careers. As a result, the Navy began to phase out its GENDET program. By late 2007, due to a demand for sailors to perform undesignated work, the Navy announced the rollout of the Professional Apprenticeship Career Track (PACT) program. PACT, much like the old GENDET program, provides male and female applicants a U.S. Navy enlistment without guaranteed Navy Class A-school assignment.

The PACT program is the last in a series of programs designed to manage this undesignated workforce. Theoretically, the PACT program was informed by the successes and failures of the previous undesignated workforce management programs. Regrettably, minimal documentation of the historic management methodologies of undesignated sailors has limited the ability of Navy policy-makers

to develop effective programs to meet the workload for undesignated workers. The purpose of this study is to document the historical undesignated work requirement; to examine shifts in demand, processes, and programs; and to provide results that will help the Navy Manpower, Personnel, Training, and Education (MPTE) community improve its management of sailors in the undesignated workforce.

Tasking and methodology

The Navy sponsor asked CNA to provide a comprehensive evaluation of the Navy's undesignated work requirements past and present, the workforce required to perform this work, and the programs used to manage this workforce. The focus of this analysis is to provide the Navy with a historical record and an assessment of the current situation.

There were five key tasks in this study:

1. Review and analyze the Navy's historical undesignated work requirements.
2. Review and analyze the Navy's historic undesignated workforce.
3. Analyze Navy undesignated work requirements under alternative management approaches.
4. Project the Navy's requirement for undesignated sailors.
5. Develop recommendations for future management of undesignated sailors.

To address these tasks, we analyzed the Navy's historical record for undesignated work requirements by looking at changes in demand for undesignated work over time and then identifying the underlying causes of the change—whether driven by policy, process, or demand. We conducted a thorough review of the Navy's past and current processes for determining undesignated work requirements through document reviews and interviews with subject matter experts (SMEs) at the Navy Manpower Analysis Command (NAVMAC), the fleets, OPNAV Staff, and Type Commanders to discuss current and historical approaches to setting requirements. This allowed us to map the requirement processes and detect actions by key players in the process that have a direct impact on the undesignated work demand signal. It also allowed us to better understand the rationale behind these actions and distinguish variability in the determination process that directly affects the demand outcomes.

Working with the Total Force Manpower Management System (TFMMS) historical and Future Years Defense Plan (FYDP) billet projections, we were able to forecast undesignated work requirements through 2025. We took into account variances in

data for Navy platforms contained in the Naval Aviation Enterprise (NAE) Master Air Plan (MAP) and the Navy's 30-year shipbuilding plan. The resulting forecast includes a baseline forecast with proposed ceilings and floors. The forecast is scaled because of the volatility of the demand signal for undesignated work as identified in the mapping process. As long as key actors have the ability to intervene to affect the demand signal, the forecast will continue to be an estimate with several possible outcomes.

We reviewed the past and current programs for the management of undesignated work, focusing on the six main programs the Navy has used over the years; GENDET, Targeted A-School Program I (TASP I) and TASP II, GENDET Targeted Enlistment Program (GTEP), National Call to Service (NCS), and PACT. We examined historical trends for Navy recruiting to assess how GENDETs and PACT sailors compare with other recruits from accession to retention. We looked at historical data for both the GENDET and PACT programs, including the following:

- Number
- Percentage of accessions
- Number by branch
- Quality
- Quality compared with other accessions
- Enlistment term
- Reaching full duty
- Switching programs
- Completing enlistments
- Being rated
- Attending A-school
- Retained

This analysis allowed us to do a cost-benefit analysis for these programs and assess the management models.

Using the key parameters from the proposed NAE pilot for A-PACT sailors, we constructed an optimization model that captured the flow of sailors from recruitment through the end of the Navy career. The optimization model seeks to find the optimal mix of rated and PACT sailors and the optimal career continuation rate for PACT sailors that minimizes expected discounted total cost while satisfying the undesignated work and reenlistment demand.

Undesignated Work in the Navy

In this section, we define undesignated work and review the history of the demand for undesignated work over time. Since the standup of the All-Volunteer Force, the Navy has recruited and accessed sailors to perform undesignated work. To understand why the Navy has recruited and continues to recruit personnel to perform this work, we must first define undesignated work. For the purposes of this study, undesignated work is defined as work that does not require skills beyond initial accession pipeline training. The Navy Enlisted Occupational Classification System (NEOCS) Manual separates this work as that which is assigned to unrated sailors.¹ Who qualifies as an unrated sailor?

Over the years, undesignated or GENDET sailors included all untrained sailors, including those who were enrolled in a rating training pipeline. This practice changed in late 2005, when GENDET sailors were separated into specific enlisted management communities (EMCs). For the purpose of this study, we concentrated only on those sailors who were recruited under GENDET or PACT sailor programs with no designated follow-on training. This difference is relevant in that these sailors were recruited into programs specifically to perform undesignated work and have to be separated in the historical data files.

Performing undesignated work requires no skills beyond initial accession training, and the work is not associated with a rating-specific occupational standard. Per NEOCS, there are no discrete occupational standards for E3 and below, with the exception of basic Airman, Seaman, and Fireman, and Airman [1]. Sailors assigned to those occupations perform the following types of work:

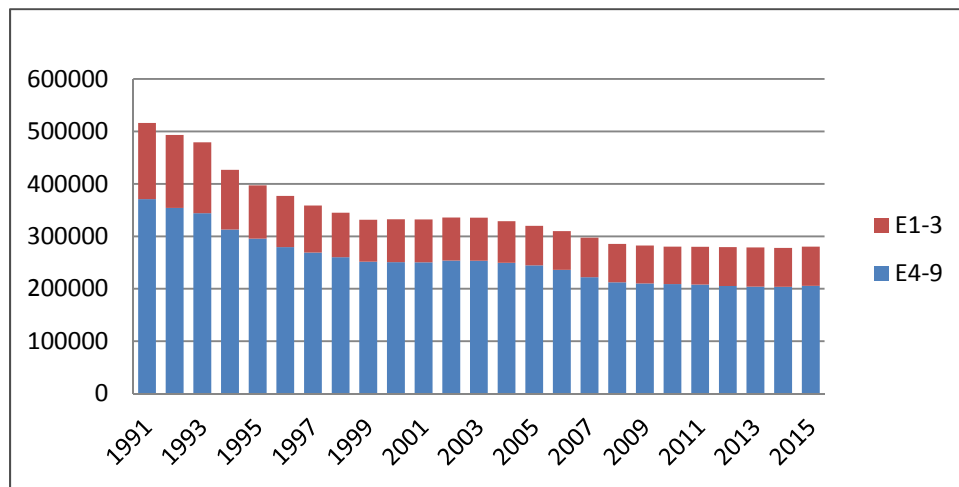
- Seaman (SN) - Keeps ships' compartments, lines, rigging, decks and deck machinery shipshape. Acts as lookout, member of gun crew, helmsman, and security and fire sentry.

¹ NEOCS provides the method the Navy uses to identify enlisted personnel skills and the manpower requirements associated with these skills. NEOCS provides the Navy the means by which all U.S. Navy enlisted personnel are classified. These standards define minimum skill and knowledge requirements for enlisted personnel at each paygrade and within each career field.

- Fireman (FN) – Cares for and operates ships’ engineering equipment (such as turbines, boilers, pumps, and motors). Records readings of gauges and maintains and cleans engineering machinery and compartments. Stands security and fireroom watches.
- Airman (AN) – Performs various duties for naval air activities ashore and afloat. Assists in the movement of aircraft. Loads and stows equipment and supplies. Maintains compartments and buildings. Acts as a member of plane handling crews.

So, if all E3 and below requirements are considered undesignated work and require only unskilled labor per the Navy’s NEOCS, then all E3 and below work could be assigned to AN, SN, and FN.² If this is the case, it would be reasonable to postulate that all E3 and below BA equals the authorized undesignated workload for the Navy. If so, the true undesignated authorized requirement would equate to 74,819 BA of the Navy’s total enlisted BA of 280,390 billets, or approximately 27 percent of the entire enlisted work in 2015, as shown in Figure 1.

Figure 1. Total enlisted BA 1991-2015



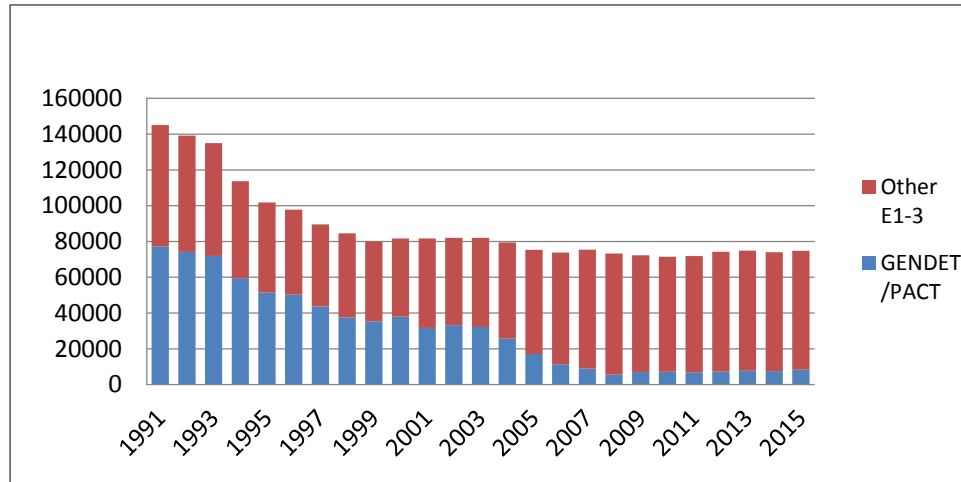
Source: TFMMS.

The Navy does not assign all E3 and below work to just SNs, ANs, and FNs, however; it assigns only a portion of the E3 and below requirement to these undesignated

² A requirement refers to a need for manpower by quantities and skills represented by a billet in Activity Manning Documents. An authorization is a funded military manpower space or billet. For the purposes of this study, TFMMS data represent Billets Authorized (BA) unless specifically noted to be requirements.

sailors. Figure 2 illustrates the proportionality of rated and unrated BA since 1991. As shown, that ratio has significantly changed over time as the Navy’s philosophy on initial training requirements has changed. In 2015, only 8,365 billets, or 11 percent of the E3 and below authorized requirement, was undesignated—a significant drop from the 53 percent in 1991.

Figure 2. E3 and below BA



Source: TFMMS.

So, if (per NEOCS) all E3 and below requirements require no additional training, why is so much work assigned to E3 and below rated sailors? Occupational Standards for sailors in Navy enlisted ratings are set based on skill requirements at the E4 level, and all subsequent A-school training is geared toward training a sailor to perform E4 skilled (rated) work. So, once again, why assign almost 90 percent of the E3 and below work requirement to sailors with training and skills above the base requirement? Navy policy, community health, and paygrade distribution are some of the factors that explain why the Navy assigns undesignated work to rated sailors. A closer look at how Navy enlisted manpower requirements are determined will further explain why undesignated work is assigned to rated sailors.

How Undesignated Manpower Requirements Are Determined

In this section, we review the Manpower Requirements Determination (MRD) process and how it affects the demand for undesignated work. The Navy has an established process for determining manpower requirements. It is governed by OPNAV Instruction 1000.16, which serves as a general reference and procedural tool for all personnel engaged in manpower requirements determination. This instruction establishes the general roles and responsibilities and provides a universal manpower requirements overview as well as specific requirements for sea and shore billets [2]. To understand requirements determination, one must understand the basic elements that determine requirements: required operational capabilities (ROC) and projected operational environment (POE), directed requirements, operational manning, planned maintenance, corrective maintenance, facilities maintenance, approved staffing standards, aviation workload measurements, utility tasking, administrative support, support action, and workload allowances [2].

Elements used to determine manpower requirements

Warfare sponsors review the Operational Requirements Documents (ORD) to determine what the Navy needs to accomplish its mission. From that assessment, class ROC/POEs are developed. The ROC/POE reflects the actual mission tasking the ship, squadron, or staff must perform to accomplish its wartime mission [3]. Therefore, ROC/POE statements provide the foundation from which afloat manpower requirements are determined. ROC/POEs are platform specific for Condition III³ operations and should be reviewed every three years and/or updated as the mission and/or capability of the platform changes [3]. Unfortunately, Navy ROC/POEs are not always reviewed according to required periodicity, nor are they updated to reflect new platform mission or capabilities. This results in a mismatch of actual platform workload and Ship Activity Manning Document (AMD) requirements. The Navy, in the

³ Condition III is wartime/deployed cruising readiness on a three-section watch basis.

last couple of years, has made a concerted effort to update class ROC/POEs. As a result, there have been changes to the class manpower documents, many of which are affecting the established undesignated work requirements. This issue will be discussed in more detail later in this paper.

Directed manpower requirements come from Navy policies that mandate key personnel billets for each platform. These billets may be increased based on overall crew ratios. Examples of directed requirements are safety petty officer, command Master Chief, career counselors, and so on. The other elements, listed previously, equate to class-specific workload factors that are measured as part of the Navy Requirements Manpower System (NRMS) analysis developed and used by NAVMAC. Per NAVMAC [4]:

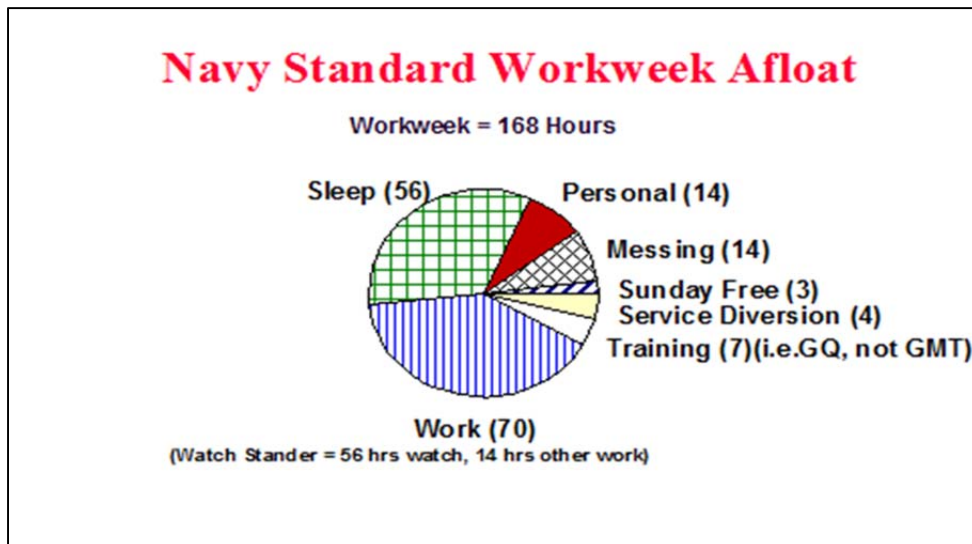
- Ship watch stations are derived from the ROC/POE, and Operational Manning is expressed in terms of watch organization in the Battle Bill. Watch standing equates to 56 hours of work per week.⁴
- Maintenance includes planned (PM), corrective (CM) and facilities (FM). NAVMAC maintains a complete database of PM schedules and computes total weekly man-hours required to perform PM based on skills and time developed by NAVSEA. CM is a directed ratio applied to PM based on the type of equipment. FM is developed using space configuration and plans for ship class in conjunction with onsite verification. FM is the largest category of work assigned to undesignated billets.
- Own Unit Support (OUS) is workload that is not watch, maintenance, or service diversion. NAVMAC uses workload factors for a 12-month period to determine OUS requirements. Examples of OUS are administrative, military, resupply, food service, hygienic, utility tasks, and special evolutions.
- Service diversion consists of actions required of shipboard personnel by regulations and the nature of shipboard/staff routine. It includes such activities as quarters, inspections, sick call, non-judicial punishment, participation in boards and committees, flight, and hangar deck integrity watches.

⁴ Aviation requirements are largely determined by Type/Model/Series (TMS) maintenance requirements vice watch standing. NAVMAC uses the Naval Aviation Logistics Command Management Information System (NALCOMIS). NALCOMIS provides real-time data on TMS Naval Aviation Maintenance Program (NAMP) requirements [5].

The NRMS process

Now that we have discussed some of the key elements used in determining afloat requirements, we will briefly describe the mechanics of how these are used in the NRMS process. The Navy standard afloat underway workweek is 70 hours. Figure 3 illustrates how the Navy arrived at 70 hours available for work using a 168-hour workweek with 56 hours for sleep and the other 42 hours for personal, training, messing, Sunday downtime, and service diversion [4]. As shown, the majority of the work hours are dedicated to watch stations. The remaining 14 hours are where the other elements are allocated. PM/CM/FM and OUS hours are computed for each workcenter by applying productivity allowances and make-ready/put-away time factors.

Figure 3. Navy standard workweek



Source: NAVMAC, Sep. 2015.

These hours are then summed with the watch base for Condition III, taking into consideration directed requirement skills. This gives the total workload by workcenter, which is then computed to determine the number of billets required [4]. These billet requirements are optimized for enlisted rating, paygrade, and Navy Enlisted Classification (NEC) using set Navy Occupational Standards, NRMS, and Paygrade Distribution Tables (PDT). The Navy Enlisted Occupational Classification System (NEOCS) is used to determine the minimum skill and knowledge requirements for enlisted personnel at each paygrade and within each career field. Work not requiring specific skills should default to Airman, Seaman, and Fireman

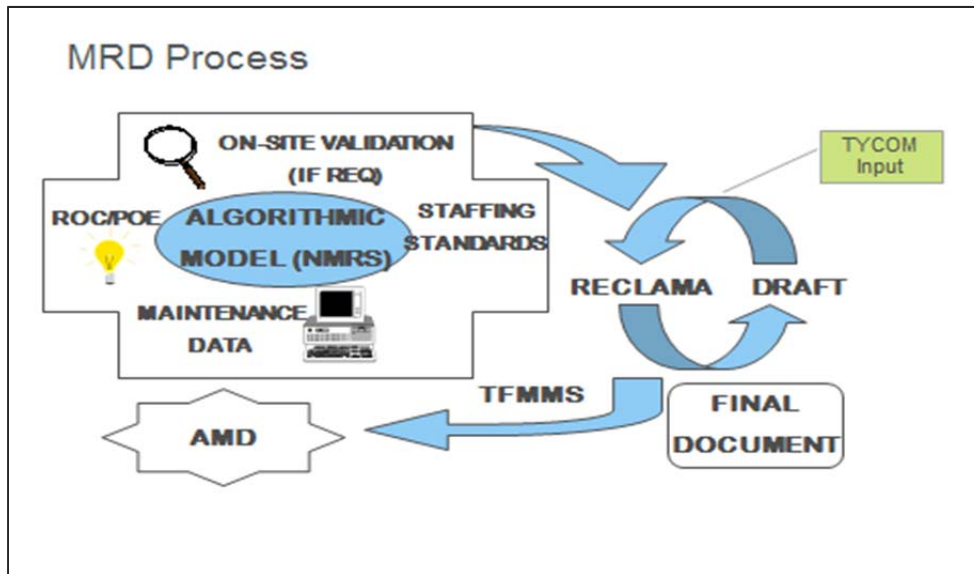
requirements. However, unskilled requirements can be assigned to ratings during the optimization process due to paygrade distribution requirements.

The PDT, which was developed in the 1970s, has not been comprehensively updated to reflect new Navy policies, community structures, and changed manning constructs. The PDT is applied to all the positions of the same rating in a division and spreads them across the paygrades [6]. The PDT determines the position paygrade unless the NMRS provides a reason why the paygrade should be increased [6]. Once the PDT and NMRS comparison has been made for each position, paygrade is assigned [6]. This explains how E1-E3 division requirements are assigned a rating. In actuality, E1-E3 work does not require rated skills; however, to allow for paygrade distribution in a division, rates are assigned to billets of E3 and below paygrades. For example, there is workload for ten billet requirements in a division. Via NRMS, the work is broken into five skilled positions where a rating is assigned and five unskilled positions where SN is assigned. However, after paygrade distribution, three of the five unskilled SN billets are designated as rated E3 and below to ensure paygrade distribution for the division, the ship, and the Navy. So, after paygrade distribution is applied, the remainder (work not assigned to a rating) is considered the true unskilled or undesignated work requirement. This work is then assigned to AN, SN, or FN in the NAVMAC manpower document or Ship Manning Document. So, is this the requirement used for undesignated workforce planning? Not yet.

The MRD process

In this subsection, we discuss in detail the MRD process and how key players in the process can affect the outcome of work demand through buy/trade decisions. The MRD is a multilayered process in which the NRMS is just the beginning. In the MRD process, key constituents have an opportunity to change the requirements in the manpower document based on their organizational perspective. Basically, all agree that there is undesignated work but disagree on who it should be assigned to perform, what quantity of work exists, and how much should be funded. These actions result in changing demand signals to the personnel management system. Figure 4 depicts the established process flow for requirements document production and approval.

Figure 4. MRD process

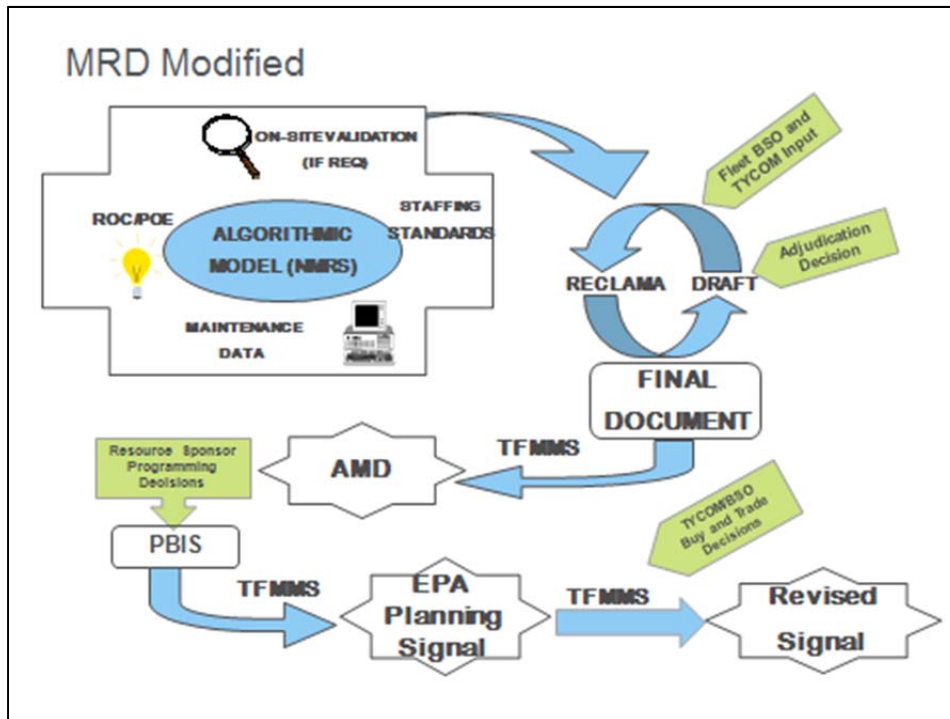


Source: PACFT N13 Brief, Dec. 2015.

As Figure 4 shows, NAVMAC establishes new ship manning document/squadron manning document (SMD/SQMD) requirements and sends them to the Fleet Commanders and Type Commanders (TYCOMs) for review and comment. Comments and reclamas received by NAVMAC are reviewed and presented to the Fleet Review Comment Adjudication Board for final disposition [2]. Approved board actions are implemented into the “Final” manpower document and forwarded back to the TYCOM. This so-called Final document is put into the TFMMS database and becomes the authoritative manpower requirement document [2].

But the process does not end there; TYCOMs often review this Final document and take additional actions based on disagreement with the board’s decision or because of budgetary constraints. This is where the process disconnects occur and demand signals get changed. Figure 5 is a modified version of the MRD process that shows additional actions by key players that result in changes to the NAVMAC document and subsequently the demand signal used by Navy planners for workforce planning.

Figure 5. MRD modified



As noted earlier, the Resource Sponsors (RSs), TYCOMs, and Fleet Commanders do not always agree with the final adjudication decision, nor do they always have the resources to fund the entire work requirement. As a result, RSs, Fleet Budget Submitting Offices (BSOs), and TYCOMs make buy and trade decisions internally that are then entered in the requirements document either through RS programming decisions in the Program Budget Information System (PBIS) or by Billet Change Requests (BCR) implemented into the TFMMS database. During the Navy Programming, Planning, Budgeting and Execution (PPB&E) cycle, changes are submitted to PBIS to reflect these budgetary decisions. The PBIS data are then used to compute Enlisted Program Authorization (EPA).⁵ EPA is calculated twice a year, usually in the spring and fall. It is at those times that the EPA is entered in the TFMMS database; EPA and TFMMS data match.

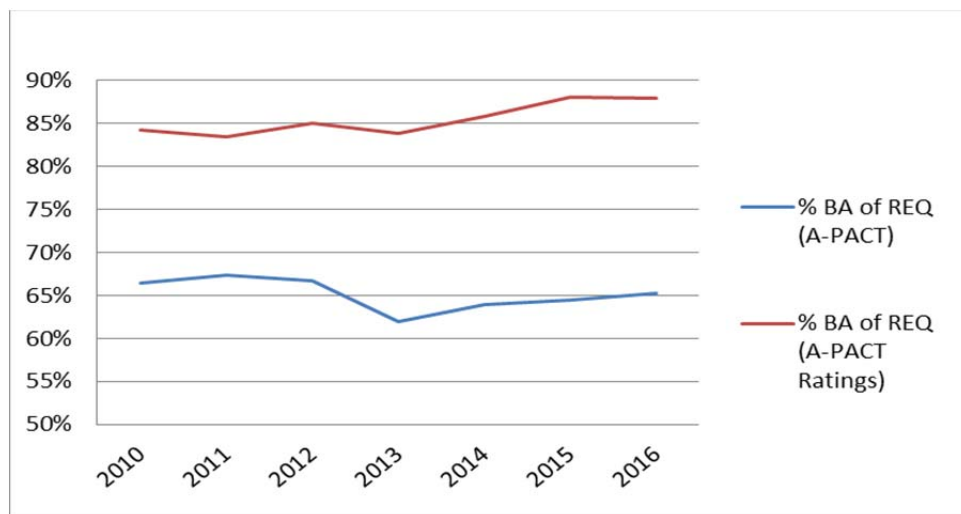
There are many reasons for these buy/trade decisions, such as budgetary constraints, TYCOM or Fleet Commander Direction, and manning issues.

⁵ EPA projects planned authorizations for current and future fiscal years (budget and program years). Planned authorizations are summarized by rating and paygrade within rating groups for each fiscal year and controlled precisely to the approved endstrength for each fiscal year.

Due to budget constraints, RSs often decide to buy (authorize) less than the NAVMAC published requirements. For example, the NAE buys approximately 87 percent of requirements, while Surface Forces buys approximately 97 percent. Buy decisions can be platform specific, with more requirements risk taken for one class of ship than another. For example, budgetary planners, fleet commanders, and TYCOMs buy only 87 percent of the Nimitz-class carrier manpower requirements, but 100 percent of the new Ford-class requirement. These buy decisions are often based on assessed risk due to operational capabilities and employment.

The decision to buy less than the SMD/SQMD requirement results in fewer funded junior billets as more senior skill billets are more closely tied to readiness. The use of composite rates for enlisted programming makes this even more attractive, with training costs being the only variable between the cost of an E2 (unskilled) sailor and an E5 (skilled) sailor. The junior billets considered the least detrimental to readiness are the unskilled or undesignated work billets; therefore, those billets are usually targeted by budgetary planners for increased risk, meaning they buy less of the requirement. Figure 6 shows the results of buy decisions for 2010-2016 for A-PACT and ratings that accept A-PACT sailors. On average, NAE authorized (bought) only 65 percent of the A-PACT requirements, whereas they authorized, on average, 85 percent of the rated requirement. Unskilled/unrated billets are cheaper to RSs than the same rank rated billets since they have no training costs associated. However, the RS often targets the unrated requirements due to readiness concerns. For these budget trade decisions, the training costs are considered nominal and part of training overhead.

Figure 6. TYCOM/Resource Sponsor BA decisions



Source: TFMMS data.

In the case of Littoral Combat Ship (LCS), DDG 1000, and Ford, however, the Navy has made a commitment to buy 100 percent of the NAVMAC SMD/SQMD requirement. Manning for these platforms is considered to be directly correlated to its mission readiness; therefore, buy-downs have a direct negative impact on mission readiness of that platform. The decision to buy 100 percent of requirement is based on a new construct of reduced manning for new platform buys. Ship crew size for these new ship classes has already been optimized (i.e., the risk was already taken up front), so, to meet platform mission, the Navy needs to buy 100 percent of the manpower requirement. This reduces the Navy's ability to make future buy trade-offs for these platforms, which reduces the number of platforms where the Navy can take manpower risk to meet budgetary constraints.

In addition to the RS and enterprise buy decisions, the TYCOMs and/or Fleet Commanders may make internal buy trade-offs. This means they may trade between skills. The OPNAV instruction allows for this trading using Requirement authorization constraint (RAC) fields in the TFMMS database to reflect the BSO's desire to change the flavor of a requirement [2]. This is often used to change a NAVMAC determined undesignated/unskilled requirement in the SMD/SQMD to a rated requirement or vice versa. These trades can occur for many reasons, such as equipment installs and deployment lessons learned. However, some are a result of Type Commander Direction due to a change in philosophy or manning concerns. The platforms under the 100-percent manning construct (such as Ford) use this trade feature. As a result of recent manpower wargaming for Ford, a significant number of internal workforce requirement trades were implemented. NAE traded unskilled PACT billets for skilled rated billets due to concerns with the Navy's ability to fill the manning requirements for PACT billets.

Further, policy-makers can trump all opinions and force buy decisions, as evidenced by the CNO's 2004 decision to eliminate unrated sailor programs and to later create PACT. This was done outside the MRD process and was implemented strictly through TFMMS, while SMDs were not changed.

Requirements CVN example

In this subsection, we provide an example of how demand inputs during the MRD process can affect the manpower demand signal for a specific ship class. Tables 1 and 2 show the results of this requirements churn for Nimitz-class carriers after the SMD was finalized. Table 1 shows a total GENDET requirement of 804 for the Nimitz 2004 SMD; however, by 2014, the TFMMS file shows only 329 BA. This is a 41-percent reduction from the SMD of record. This reduction can be contributed to the buy and trade decisions discussed earlier in this section. Table 2 illustrates the amount of change the new 2014 Nimitz-class SMD has from the previous SMD and TFMMS. The last column in the table shows the expected NAE authorizations for the new

NAVMAC SMD. Once again these numbers differ from both the SMD requirements and the current TFMMS BA. These tables highlight the volatility of the work requirement for one ship class. With this constant churn, it is easy to see why Navy planners have difficulty hitting workforce targets, especially when requirements for a rating are aggregated across all Navy platforms.

Table 1. Nimitz-class CVN requirements buy/trade decisions

Nimitz-class CVN			
	NAVMAC SMD (2004)	TFMMS 2014	Change due to policy and buy/trade decisions
AN	581	209	-372
FN	119	10	-109
SN	104	110	6
Total	804	329	-475

Table 2. Nimitz-class CVN requirements changes

Nimitz-class CVN				
	New NAVMAC SMD (2015)	Change from SMD (2004)	Change from TFMMS 2014	Expected NAE Buy 2016
AN	349	-232	140	242
FN	45	-74	35	18
SN	70	-34	-40	57
Total	464	-340	135	317

So, which one of these requirements is used for undesignated workforce planning? As shown in Figure 5 and highlighted in Tables 1 and 2, it depends on when the TFMMS data are pulled. Navy planners use the biannual EPA to conduct workforce planning for accessions, promotions, high-year tenure approvals, retention, and the like. However, Fleet Commanders and TYCOMs predominately use BA when planning for in-year and out-year manpower and manning requirements. Further, platform fill is computed by comparing inventory to BA, not to EPA, which the Navy uses to build its accession, retention, and promotion plans.

These buy and trade decisions between GENDET/PACT and rated billets can result in TFMMS-to-EPA mismatches. So, if OPNAV N13 planners pull TFMMS data at different times during the budget cycle, they will likely get different BA signals to which to plan, as shown in Figure 7. The end result is that accession planners may access too many sailors to fill nonexistent requirements or not enough sailors for increased requirements in specific positions.

Figure 7. A-PACT EPA/BA disparities

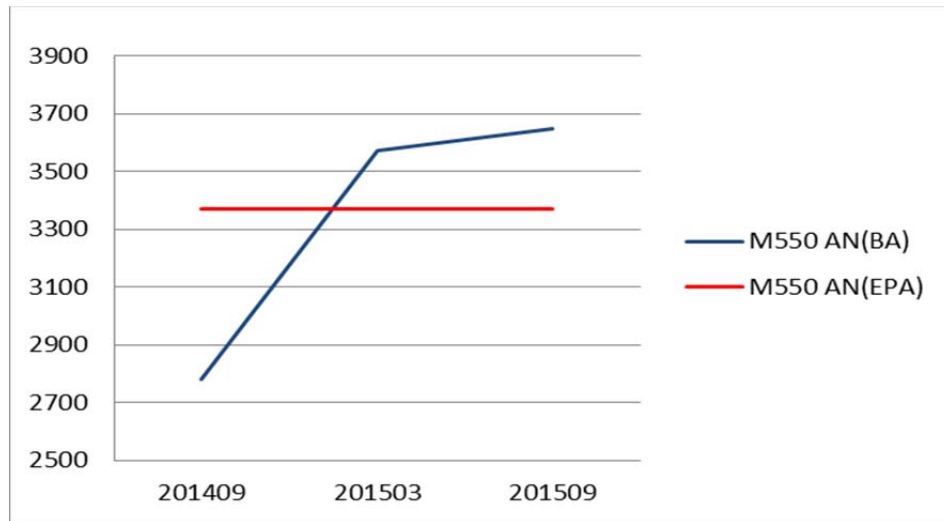
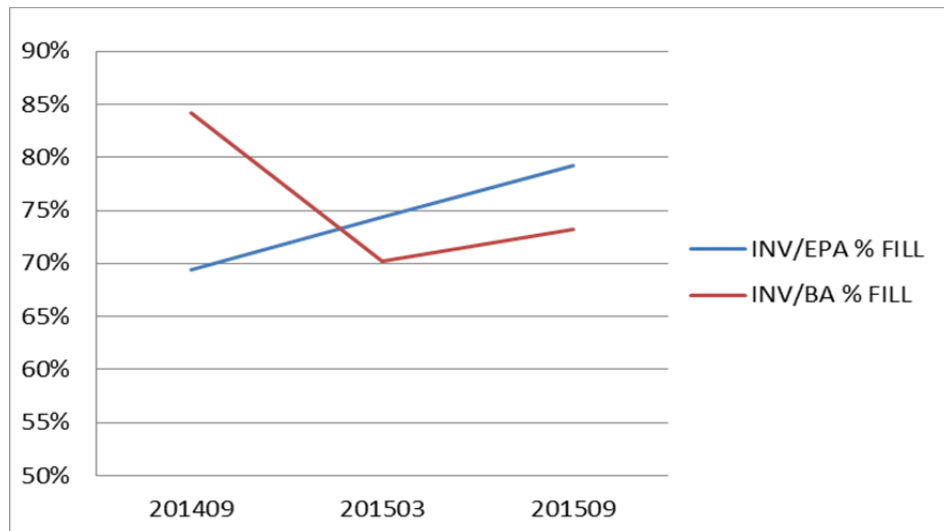


Figure 8. A-PACT versus EPA fill percentage



Source: TFMMS and N12 EPA data

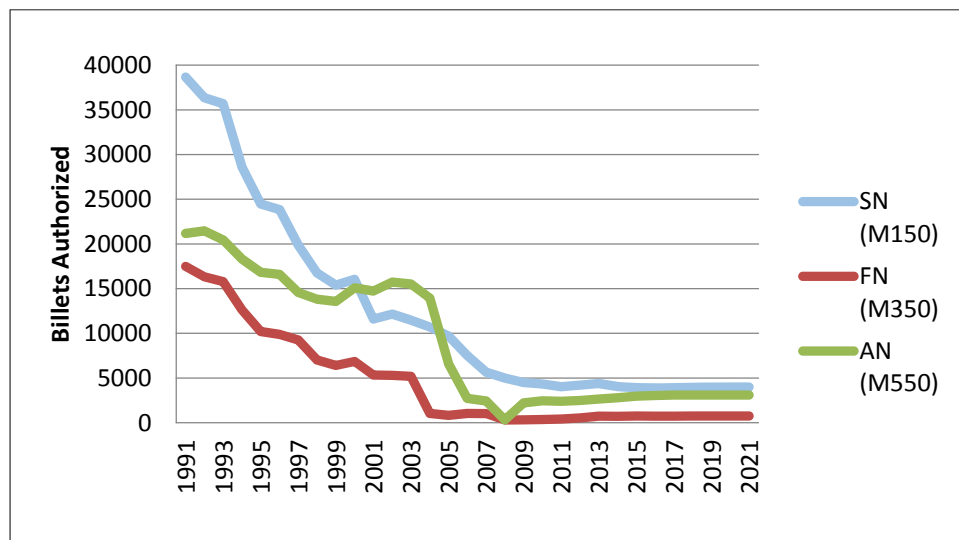
These EPA/BA mismatches often result in manning issues, such as those shown in Figure 8. These manning issues perpetuate fleet dissatisfaction with the process and often result in more buy/trade actions by the TYCOMs. As stated earlier, due to low A-PACT fill rates, COMNAVAIRFOR plans to swap out USS *Ford*'s A-PACT BA for rated BA to ensure higher fill rates for this platform. However, this type of swap-out will not be seen by the planners until the next EPA is issued, often causing a 9- to 12-month lag in accession adjustments. For a program with a short time horizon,

such as PACT planning, accessing to the wrong demand signal can have negative manning consequences very quickly.⁶ To alleviate some of this churn, it is recommended that all key constituents in the MRD process agree on a baseline planning number, either EPA or BA, on a given date in the annual cycle.

Historical changes to the undesignated work requirements

Throughout the years, the Navy's undesignated work requirements have fluctuated. In this subsection, we look at the changes to the aggregated undesignated work requirement as well as changes to the individual career groups. As seen previously, this fluctuation as a ratio of total enlisted requirements has trended down. A look at the GENDET and PACT requirements in Figure 9 shows that, traditionally, SN requirements were the largest GENDET share. From 2000 to 2005, however, AN requirements surpassed SN for the first time. During this time, the Navy was downsizing surface requirements while maintaining aviation assets in support of Operations Iraqi Freedom/Enduring Freedom (OIF/OEF).

Figure 9. End-of-Year GENDET/PACT BA



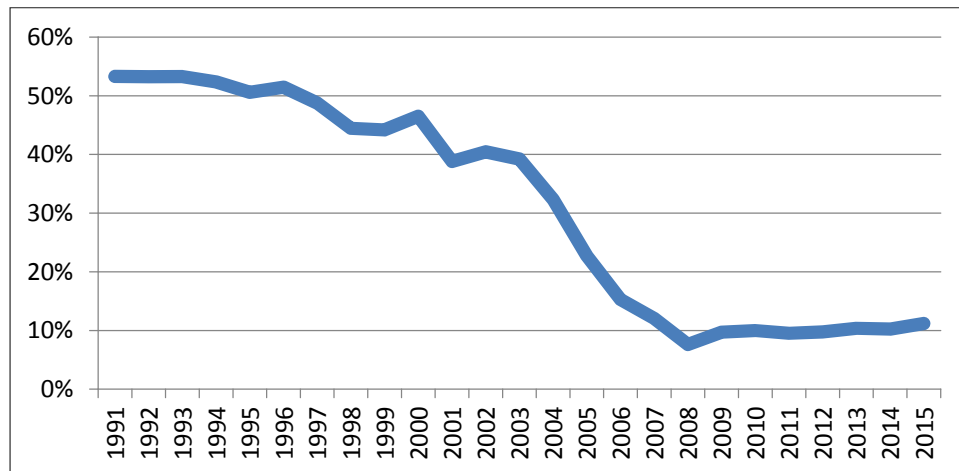
Source: TMFFS data.

⁶ Most PACT sailors only remain in the PACT program for 14 months, at which time they become rated.

By 2006, when the GENDET program was slated for disestablishment, SN BA remained authorized while AN BA was virtually zeroed out. This continued authorization for SN BA was caused by significant pushback from the Fleet Commanders and TYCOMs on the proposed dissolution of GENDET requirements. COMNAVSURFOR, specifically, protested that there was undesignated work on board surface platforms that should be performed by the unskilled labor workforce and not by skilled sailors in whom we have invested training dollars. They were joined in this dissent by COMNAVAIRFOR, who was dissatisfied with the plan to assign only rated sailors to squadrons and aviation platforms; they too felt that there was undesignated work that needed to be performed by undesignated sailors. As a result, the PACT program was established in 2007 and was officially stood up in 2008.

Figure 10 shows what the change in percentage of GENDET/PACT was to overall E3 and below BA over time. At the standup of PACT, it was determined by key SMEs to keep the PACT BA less than 10 percent. As the figure shows, the PACT BA in 2009 was approximately 8 percent; by 2015, it had increased to 11 percent.

Figure 10. E3 and below BA percentage of GENDET and PACT

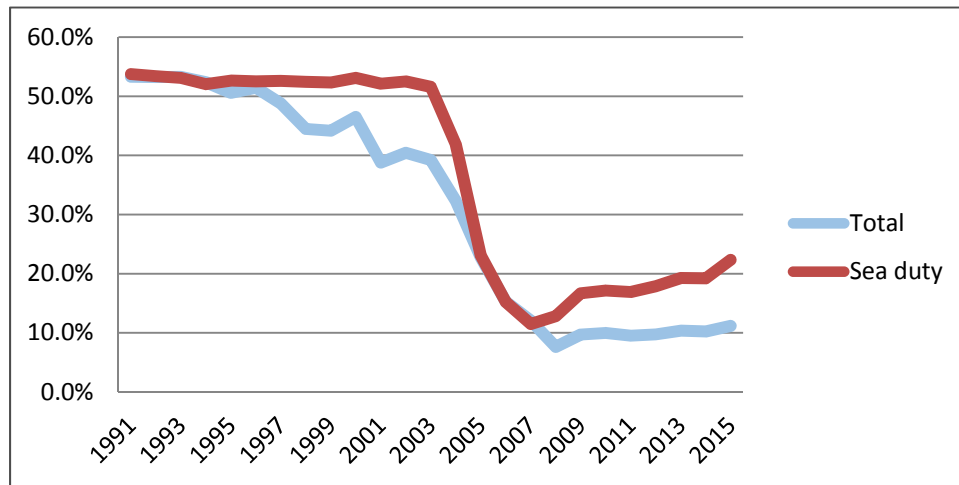


Source: TFMMS data.

Why the growth? As Figure 11 illustrates, E3 and below BA is increasing across the Navy. Therefore, it is not unexpected that PACT BA as a proportion of the work requirement would also increase. Also, according to NAVMAC SMEs, the jump from 8 to 11 percent of BA is a result of Ship Manning Document reviews that continue to shift the PACT BA to the increased proportion seen in the manning documents before the dissolution of the GENDET program. The rationale for this is simple: the work requirements are unskilled and therefore undesignated in the NRMS. This continued increase, which appears small in terms of percentages, equates to an almost 50-percent increase in PACT BA with total PACT BA increasing from 4,400 in 2008 to over 8,000 in 2015. This has caused continued churn in the demand signal

for the accession and community planners and has caused management issues for the PACT program, which will be discussed later.

Figure 11. Total E3 and below BA trends



Source: TFMMS.

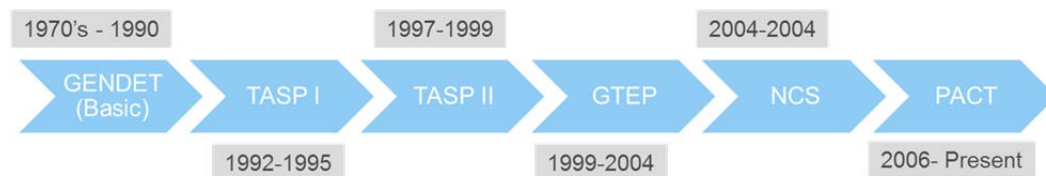
During the transitions (GENDET to rated and rated to PACT), SMEs worked together to allocate GENDET BA to ratings and then to PACT requirements. They also identified PACT-in ratings and quotas.⁷ Although they had quantitative (1306, Career Renlistment Objectives (CREO) and Enlisted Master File (EMF)) data that showed sailors' rating requests and ultimate rating assignments, they used mostly qualitative methods to allocate BA. SMEs, drawn from the Enlisted Community Managers, NAVMAC, PERs 4010, and N13, used empirical data from SME experience to select ratings for GENDET BA and PACT standup. During the process, mistakes were made and planners had to adjust BA over time to more accurately align with sailor propensity. For example, when transitioning BA from GENDET to rated BA, they restricted the BA transfer to a select few ratings that have since been expanded to include other ratings with unskilled work at the E3 and below level. Further, when transitioning BA from ratings to PACT, they overestimated sailors' propensity for the Culinary Specialist (CS) and Mineman (MN) ratings and allocated too many PACT-in quotas for CS and MN, which were not used. Also, in the first two years of the PACT standup, they did not hold back PACT-in BA for transitioning PACT sailors, accessing too many rated sailors into PACT-in communities. Analysis of the flow of BA during these transitions can be found Appendix A.

⁷ PACT-in ratings are those ratings that recruit below their EPA requirement in order to hold quotas for PACT sailors.

Overview of Alternative Approaches for Managing the Undesignated Workforce

From the standup of the All-Volunteer Force, the Navy implemented various personnel management programs to manage its undesignated workforce. In this section, we take a closer look at the alternative ways to manage undesignated work. Programs were disestablished or modified to meet the needs of the Navy and/or policy-makers at the time, to improve functionality of a program, and to meet sailor demands. Figure 12 shows a timeline of the most recognized GENDET programs.

Figure 12. Timeline of undesignated work programs



Regardless of which undesignated work program was in effect, the same problems continued throughout the timeline. There are three main problem areas:

- Manning issues
- Poor program execution
- Burden to fleet

To address these issues, the Navy implemented program changes as it moved from one program variation to the next. For instance, to address manning issues, the Navy set minimum time-on-board (TOB) requirements for sailors before they could request rating designation. This change resulted in improved manning. As the Navy shifted to more a sailor friendly agenda, however, it removed this TOB minimum and went back to minimum time in grade (TIG) for rating eligibility, reversing the improvements to program manning. Recently, the Navy reinstated the TOB minimum. Through the years, improvements to supply chain management and distribution have been introduced to improve manning, but these have had little impact on

undesigned sailor manning because the Navy continues to use this program as a manpower safety valve.

To improve program execution and reduce the burden to the fleet, the Navy reduced GENDET ratings and formed rating fields. Unfortunately, in execution they failed to ensure that sailors were qualified for all ratings in the field. If executed correctly, this concept would have better set sailors' rating expectations and reduced program churn on the fleet. Under the PACT program, however, due to pressure to provide a more "sailor first" program, the Navy again increased eligible ratings resulting in more churn and execution issues.

The Navy continues to correctly identify areas to improve these programs, but it fails to follow through with the program improvements. The Navy needs to learn from its past and address the systemic problems of the current program instead of moving on to a new pilot program. The next two subsections give a more detailed description of the GENDET and PACT programs.

GENDET programs

Through 2004, the Navy primarily relied on the General Detail (GENDET) program to provide the undesigned work labor force. Over that time period, there were several variations on the GENDET program, which included differing contract lengths, program requirements, and sailor outcomes. These included the GENDET basic, GTEP, TASP I and II, and NCS programs, which we will discuss in detail later. In 2005, the Navy announced the dissolution of all GENDET programs. Although the Navy touted a change in its philosophy toward training sailors as the reason for the sundown of the GENDET program, numerous problems within the GENDET program and a general fleet dissatisfaction led to this action by the Navy.

During discussions with key SMEs from the fleet and the MPT&E organization, it was made clear that the GENDET program was thought of by many as a fire-and-forget program. The sailor would join the Navy as a GENDET—Airman, Fireman, or Seaman—normally for a 4-year contract. After bootcamp, sailors would be assigned to various commands throughout the fleet. The intent was that, once on board their new command, GENDET sailors would receive guidance, assistance, and on-the-job training from their new chain of command. During GENDET sailors' period of enlistment, they would select a rating to "strike" into. If they failed to rate, they were separated from the Navy at the conclusion of their term of service.

The GENDET program lacked timelines and fixed expectations. Sailors were not expected to rate at a specific point during their enlistment and, in fact, could remain an AN, SN, or FN for the entire period. The onus was on commands to guide sailors to a rate. Further, there was great disparity among commands on how well they

mentored their GENDET sailors: some did it well; others did not. Although the number of GENDET sailors fluctuated over the years, it remained a significant portion of the E1-E3 population. Therefore, the requirement to manage GENDET careers levied a significant burden on commands. Because there were no specified Armed Services Vocational Aptitude Battery (ASVAB) requirements for most GENDET sailors, these sailors tended to be lower quality with poor ASVAB scores and/or entrance waivers. Being lower quality limited the number of ratings available to them and made striking via the Navy Wide Advancement Exam (NWAE) more difficult. Per Navy program guidelines, sailors were eligible to request an A-school after serving on board 12 months. Actual program protocols, however, were left up to individual commands, meaning requirements and timelines for eligibility to strike and/or submit a request for a rate, exam, or A-school quota varied by command. Therefore, sailors serving on sister ships could have completely different expectations of the career timeline and eligibility requirements for achieving a rate. A sailor on one ship may have been required to complete all Basic Military Requirements (BMRs) and Personnel Qualification Standards (PQS) for seamanship, repair locker, first aid, firefighting, etc., while a sailor on the adjacent ship would only need to complete BMRs and meet minimum Navy program timelines.

Throughout the course of the GENDET program, there was a general dissatisfaction by both sailors and commands; as a result, every few years the Navy would roll out a pilot GENDET program to try to address these concerns. One such pilot program was the GENDET Targeted Enlisted Program. TASP was introduced as a result of concerns voiced at the Flag Manning Conference held May 4-5, 1989 [7]. The conference concluded that there was a need to establish a new guaranteed 4-YOS A-school program to improve and sustain GENDET manning. TASP also sought to enhance personnel management and utilization of training resources by improving the Programmed School Input (PSI) execution problems in the fleet [7]. Personnel enlisted under TASP were recruited in the summer surge months, June through September, with a “specific” guarantee of A-school training 18 to 24 months following recruit training [7]. The intent of the program was to have sailors receive initial training, report to the fleet, return to school for technical training, and then return to the same fleet unit.

The program set aside A-school quotas for both 4- and 5-year ratings for TASP GENDET sailors [7]. There were 34 ratings designated as TASP ratings with 1,103 reserved A-school quotas. TASP recruited individuals to a targeted rating; however, the contract allowed flexibility for the sailor to strike for another rating. The TASP program was modified in its first year to add automatic advancement to E4 on completion of the targeted A-school. This change was made because of complications with TASP sailors who became eligible for E4 long before attending A-school. These sailors were likely recruited under recruiting advancement incentive programs as E2s or E3s. At its inception, there were nearly 38,000 GENDET fleet requirements, with TASP making up approximately 4 percent.

Unfortunately, there were distribution and supply chain issues. Training quota managers continued to have issues matching sailor school timing and A-school seats causing backlogs and unplanned delays for the sailors [8]. Also, the distribution system failed to meet the original tenet of the program, which was to return the majority of sailors to their previous fleet assignments. Instead, most TASP sailors were sent to new commands on completion of A-school training. This caused reluctance on the part of commands to release sailors for training, at least until a replacement was on board. Unfortunately, slated replacements were not always available because of the narrow recruiting window for the program. Further, sailors often had buyer's remorse with respect to their chosen rating, and approvals to strike for another rating were not often approved [8]. These issues caused dissatisfaction with the program for both sailors and the fleet. As a result, the TASP pilot ran only from 1989 through 1992.

Ongoing sailor and fleet dissatisfaction led the Navy to continue to try to improve the basic GENDET program. In 1997, the Navy rolled out TASP II for SN/FN. TASP II kept the basic models of TASP by recruiting sailors from June through September with a guaranteed A-school; however, TASP II incorporated several changes in an attempt to improve the program. TASP II personnel, on completion of recruit training, received GENDET orders for a maximum of 12 months to their initial assignment vice the 18 to 24 months under TASP. The intent was to send them to A-school in January through July in the year after they were accessed to make use of underutilized training quotas and reduce command and distribution influence to the process. Orders to the A-school were supposed to be issued one month after sailors arrived at their fleet assignments, but this was not always the case. For TASP II, the Navy allocated 1,500 recruit quotas for a narrower choice of ratings than under the original program. TASP II sailors were guaranteed assignment to one of the following A-schools: GSM, GSE, AECF, FT, ETS, MT, STS, MMS, STG, EW, CTI, CTM, or RM [9]. Most of these ratings required higher ASVAB scores and clearance eligibility requirements than most GENDET sailors possessed, meaning that only the top GENDET applicants qualified for the TASP II quotas.

In 1999, as a follow-on to the TASP II, the Navy implemented the GENDET Targeted Enlisted Program. Like the previous programs, GTEP was advertised in the June 1999 NAVADMIN as a recruitment program designed to improve GENDET manning and A-school off-season utilization [10]. The program offered recruits a \$2,000 enlistment bonus to be paid at the completion of apprenticeship training and a guaranteed A-school on completion of an initial 9- to 15-month GENDET tour [10]. GTEP was designed to offer a field of ratings vice one specific rating. The school field was composed of ratings with similar ASVAB requirements, and the 4-year enlistment contract guaranteed one of the ratings in the school field. The Navy allocated 1,000 accession quotas to the program for the following school fields: Admin (YN, DK, RP, PN), Controller/Guidance (AG), Engineering (EN, MM, GSM, MR), Electronics (STG), Electrical (EM, GSE), Hull/Combat Systems (DC, HT, MN), Navigation (QM, SM),

Operations/Communications (OS/RM), Ordnance (GM), Special Services (MS, SH), and Mechanical Aviation (AME, AM) [10]. Once again, the goal was to return sailors to their commands after completion of the A-school, dependent on availability of a valid billet.

The premise for GTEP was to recruit applicants during the rich summer surge recruiting environment by guaranteeing them deferred training when training demand was low. The idea was to give the sailor greater choice while pushing training out past high-demand training periods. Increasing the number of ratings also allowed for increased flexibility for staggering school start dates to alleviate supply chain management issues [8]. Unfortunately, the Navy failed to execute the program as intended. Applicants were required to meet ASVAB qualifications for only one of the ratings in the selected field [8]. This resulted in limited sailor choice within their rating field and supply chain mismatches. The supply chain saw all sailors recruited into a field as qualified for any rating in the field. This was not the case. So, there were often too many sailors for one rating and not enough qualified for another, resulting in delayed A-school orders, training backlogs, and continued unused school quotas. Lastly, as with the previous programs, most sailors were not returned to their previous command, continuing the fleet's dissatisfaction with these programs [8].

As part of the FY 2003 Military Appropriations Act, Congress passed a requirement for all of the services to develop a shortened enlistment program by October 1, 2003, under the National Call to Service (NCS) Initiative. At this time, the Navy had very limited 2- and 3-year enlistment options available to recruits (2 years active duty, followed by 6 years in the reserves). Therefore, to meet congressional mandates, the Navy used the GENDET program to recruit approximately 500 sailors into the NCS program [8].

The NCS is not really a 2-year enlistment. The actual time spent on active duty depends on the length of initial training required. The law required the services to field a program for 15 months of active duty, following training. So, if bootcamp is 9 weeks, and the sailor has basic AN GENDET training of 3 weeks, that individual would incur a total active duty commitment of 18 months (3 month of training plus 15 months of active duty after training) [9]. However, for recruits who enlisted into the NCS, the active commitment was only the first requirement. Like regular enlistment programs, the recruits were obligated for a total service period of 8 years. Whatever time remained on the 8-year commitment after the active duty period had to be spent in one of the following programs:

- Active duty
- Selected Reserves
- Inactive Reserves
- Another program, such as Peace Corps or Americorps
- A combination of any of the above

In 2005, the Navy announced the dissolution of all GENDET programs as it moved toward a commitment to provide up-front training to all future sailors with formal school training as part of their naval careers. This initiative was intended to provide fleet GENDETs an opportunity to be rated with or without A-school depending on their desires, qualifications, and the Navy's needs [7]. However, this initiative did not account for the undesignated work that still needed to be accomplished. The fleet pushed back, stating that it was not cost-effective to train sailors to do undesignated work, nor was it good for morale. In response, the Navy stood up the PACT program. In the NAVADMIN announcing the standup of the PACT program, the Navy explained,

Our analysis and Fleet feedback showed that a closely administered apprenticeship program was needed to provide flexibility for sailors which do not desire to select a rating prior to enlisting for their first term. Additionally there remained significant apprentice level work in the fleet which must now be accomplished by rated sailors expecting a more challenging assignments to build on their initial A school training. To better utilize the skills of our trained junior sailors and provide an apprenticeship to rating career path option the PACT program began in October 2007. [11]

PACT program

PACT, much like the old GENDET program, provides male and female applicants an opportunity to serve in the Navy as an undesignated sailor, but it does not guarantee a Navy A-school assignment. PACT is designed to enlist sailors into a monitored general apprenticeship program. This program provides apprentice-level formal training and on-the-job training leading to a viable career field. The original billet base for PACT was about 4,500 billets, which grew to over 8,000 in 2015. PACT requires a 4-year enlistment. Once sailors finish bootcamp, they attend the core apprenticeship training program for their PACT pipeline—Surface (Seaman), Aviation (Airman), or Engineering (Fireman).

PACT sailors are expected to be on pace to designation approval either within 24 months of their initial enlistment or after serving a minimum of 12 months on board, whichever occurs last [12]. PACT sailors obtain rating designation through the C-WAY-PACT module by submitting a request through their Command Career Counselor (CCC). PACT sailors can request a Navy A-school after 12 months on board provided they have maintained PACT program and A-school eligibility. Originally, sailors who had either 12 months on board or were time in rate (TIR) eligible for the E4 NWAE could request to directly designate into a rating that does not require an A-school as long as a billet existed on board the command. Table 3 lists the ratings that qualify for direct rating entry designation (RED). This policy has recently changed, and all PACT sailors must now serve a minimum of 12 months, regardless of TIR

eligibility, prior to rating designation. This means that PACT sailors who are TIR eligible after only 120 days on board must wait until 12 months on board to rate even if a RED quota is available. Sailors who have served 6 months on board their command and want to designate to a rating outside their current career pathway must request conversion via the C-WAY-PACT module [12]. For instance, if an AN wants to become an MA, he/she would request conversion to SN, which is the career pathway for MA.

Table 3. Navy ratings (EMCs) that do not require an A-school

Ratings that do not require an A-school		
ABE	BM	MN
ABF	CS	MR
ABH	CS GRP 1	MU
AD	CS GRP 2	OS
AE	DC	PS
AM	EM	QM
AO	EN	RP
AS	GM	YN
ATI	GSM	YN GRP 1
ATO	MC	YN GRP 2
AZ	MM	

Once the CCC submits a rating designation request application for a sailor, that application is compared with other sailor applications within the same year group (YG) and enlisted management code (EMC) using the rack-and-stack process [12]. The rack and stack uses a set algorithm to compare applications (see Figure 15). The rack-and-stack results are reviewed by Enlisted Community Managers (ECMs) and published monthly. Sailors may submit an application every month until they obtain rating designation approval. Unfortunately, sailors may have to wait in line to get approval as other more senior PACT sailors bump them in the rack-and-stack process. Most PACT sailors submit multiple applications during the rating process; this can cause PACT morale issues because they receive multiple rating request disapprovals. The onus is on CCCs to explain the process and keep them motivated. If a PACT sailor has not received a quota into a new rating within the original 24-month window, he or she will be assigned a rating based on individual eligibility and Navy needs [12].

Sailors who drop out of other rating pipelines can be reclassified into PACT if PACT billets are available. Reclassified sailors are subject to all the requirements of the PACT program, including rating timelines [12]. Approximately 21 percent of PACT sailors are from reclassifications [13].

Analysis of Alternative Approaches to Performing Undesignated Work

There has been little historical analysis of how the Navy has addressed the performance of undesignated work. In this section, we review trends in historical and current programs for performing undesignated work. We compare key metrics, such as attrition, retention, recruiting, and training.

After reviewing the trends in undesignated work, we introduce a model for performing both undesignated work and work in related ratings. We compare the results under the PACT and GENDET programs for both performing work and their relative costs.

Background and historical trends

The performance of a variety of semiskilled work has long been an essential part of the Navy. Despite a long history of recruiting people to perform this work, there has been very limited analysis of the results of using them to perform undesignated work.

One of the few analyses of undesignated work was performed by Cylke in 1994 [14]. He examined the numbers of sailors in the GENDET program, as well as their recruit quality, career patterns, and retention. He found that most GENDETs became rated without attending A-school and that GENDETs were retained beyond their initial enlistment at a rate only about 5 percentage points less than A-school recruits, once recruit quality was taken into account.

We examined the following historical trends for Navy recruiting to assess how GENDETs and PACT sailors compare with other recruits from accession to retention:

- Number
- Percentage of accessions
- Number by branch
- Quality

- Quality compared with other accessions
- Enlistment term
- Reaching full duty
- Switching programs
- Completing enlistments
- Being rated
- Attending A-school
- Retained

Figure 13 shows the trend in GENDET/PACT accessions over the last 30 years. GENDET accessions ranged from 20,000 to nearly 35,000 recruits from 1983 to 1995. The number declined to 10,000, and declined to less than 2,000 from 2007 to 2009, before increasing to about 5,000 a year under the PACT program since then.

Figure 13. GENDET and PACT accessions

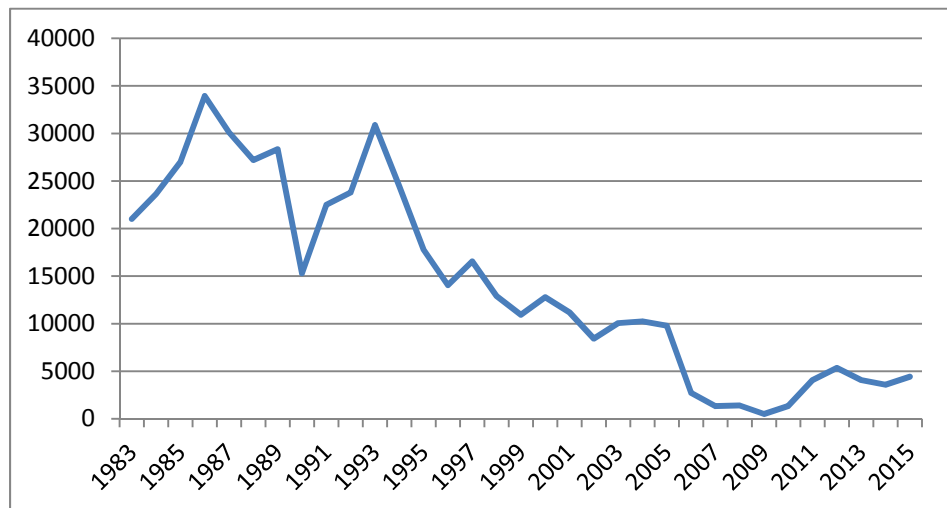
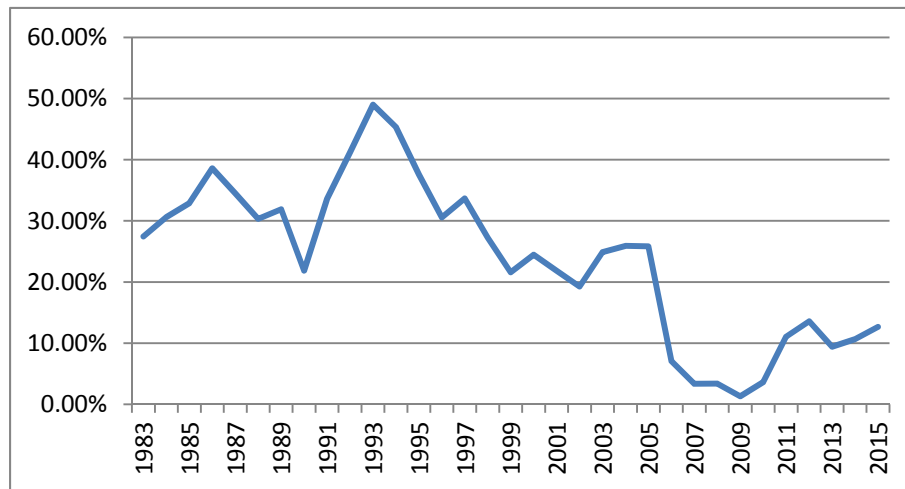


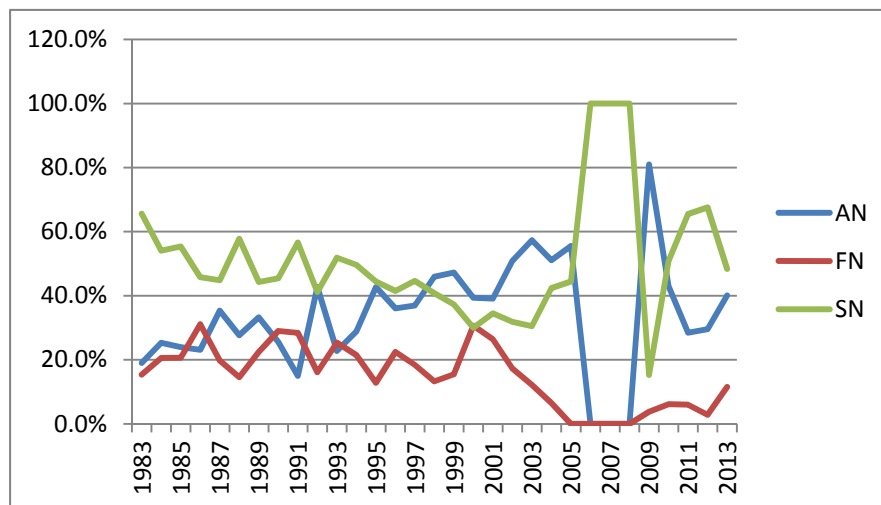
Figure 14 shows the percentage of accessions that were GENDETs or PACTs. This figure provides a similar picture of the changing role of PACTs and GENDETs in the Navy's workforce. The percentage of accessions that were GENDETs was usually above 20 percent from 1983 to 2005, peaking at 49 percent in 1993. When the GENDET program was largely eliminated, these sailors were no more than a few percent of accessions from 2007 to 2009. The PACT program has accounted for about 10 percent of accessions since 2010.

Figure 14. GENDET and PACT accessions as a percentage of total



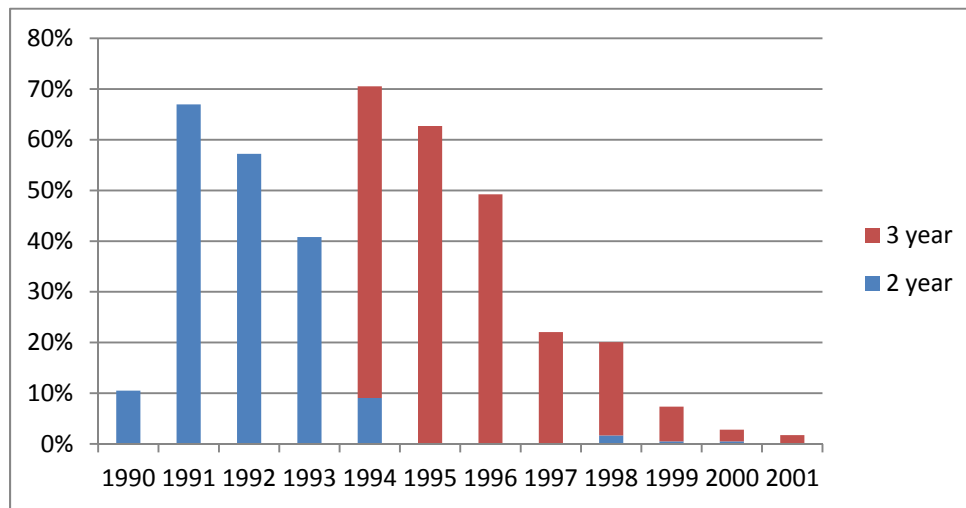
The Navy assigns GENDETs or PACTs into one of three principal branches: Seaman (SN), Fireman (FN), or Airman (AN). Figure 15 shows how this composition has changed over time. It shows the percentage of GENDET and PACT accessions that fell into each branch. Initially, Seamen were the most common GENDET program, and Firemen accounted for about 20 percent. The Airman program increased its share of GENDET recruits since 1992. Since then, except for the three years when GENDETs were being phased out, Airman and Seaman have accounted for roughly the same *share of recruits*.

Figure 15. Percentages of GENDETs/PACTs by branch



The Navy has also used different enlistment terms for GENDETs, especially during the downsizing that occurred during the 1990s. Figure 16 shows the percentage of GENDET recruits that enlisted for two or three years. From 1990 through 1998, two- and three-year enlistments accounted for at least 20 percent of GENDET recruits, reaching a peak of 70 percent in 1994. The two-year option was dominant from 1990 to 1993, and the three-year option became commonly used from 1994 to 1998.

Figure 16. Percentages of GENDETs with two- and three-year enlistments

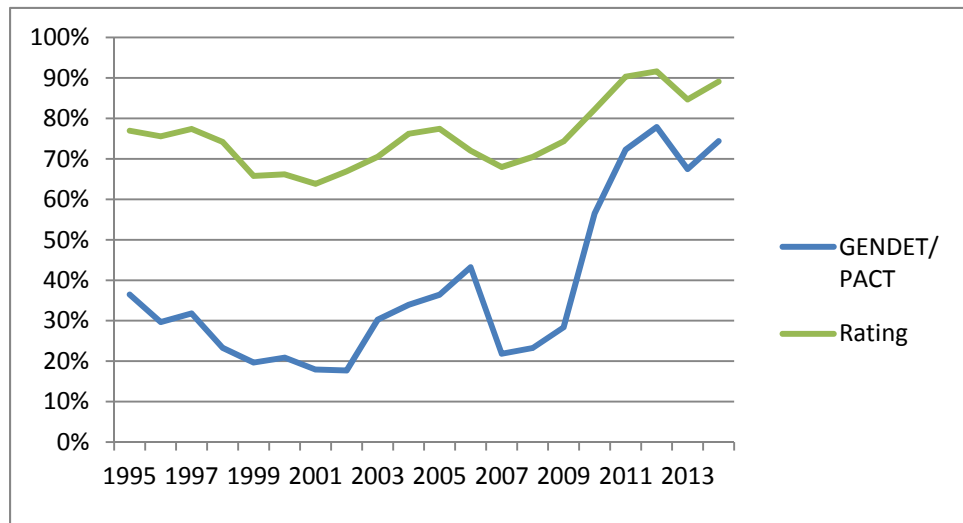


An important metric for GENDET and PACT sailors is recruit quality. It is defined by education and test scores. Recruits with high school diplomas and Armed Forces Qualification Test (AFQT) scores at or above the 50th percentile are the most desired kind of recruits. Recruits with these attributes are most likely to complete training and their enlistment and to qualify for many of the Navy's most demanding technical ratings. In Navy parlance, these high-quality recruits are known as A-cells.

Figure 17 shows how the percentage of high-quality GENDETs has changed since 1995. In this case, we are comparing GENDETs and PACTs with other Navy sailors who enlisted for four years. A minority (20 to 40 percent) of GENDET recruits were high quality. In contrast, the majority of recruits entering ratings were high quality; usually 70 percent or more were A-cells.

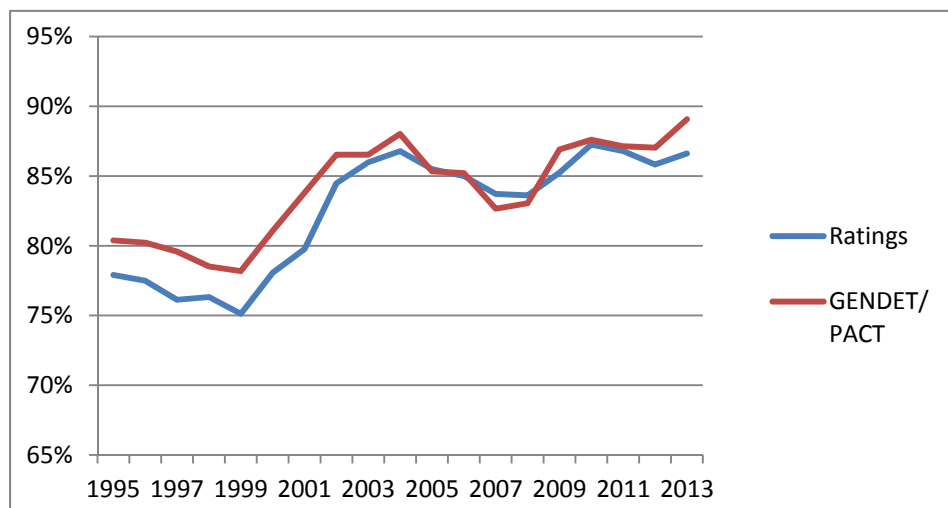
The quality of PACTs increased substantially over that of GENDETs. The majority of PACT recruits have been A-cells, and since 2011 about 70 percent have been high quality. The percentage of high-quality recruits going into ratings has also increased. However, the difference in high quality has decreased from over 50 percent to less than 20 percent since 2009. The increase in quality also could be the result of the recession and the introduction of the Post-9/11 GI Bill. Both of these affected recruiting at the same time that the PACT program was introduced.

Figure 17. Percentages of high-quality recruits



We also are interested in what happens to recruits once they enter the Navy. Figure 18 shows the percentages of GENDETs and PACTs—as well as those entering ratings—that enter full duty.

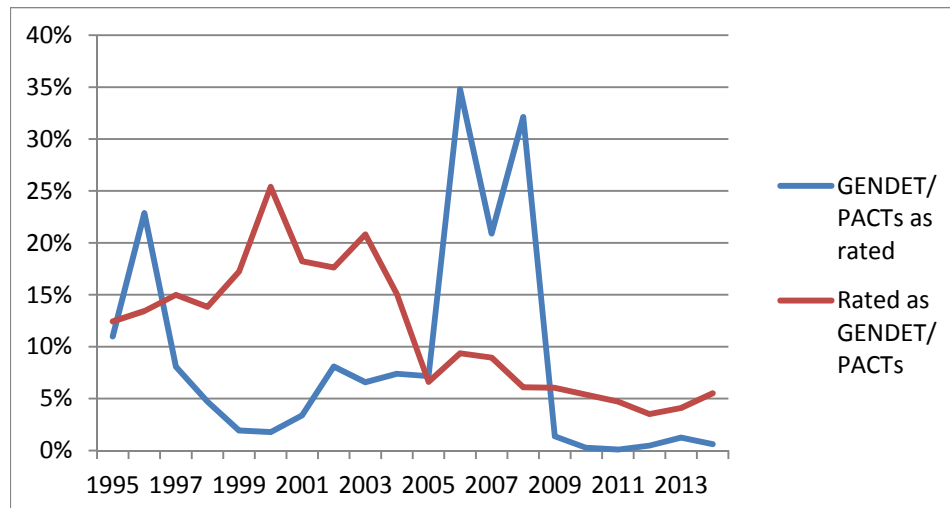
Figure 18. Percentages of accessions reaching full duty



We note several things in Figure 18. First, there has been an overall trend of improved percentages reaching the fleet since 2002. And the percentage of GENDETs/PACTs reaching full duty has been slightly higher than that of recruits entering ratings. This is likely because it takes sailors longer to reach the fleet when they enter A-school training immediately after recruit training.

While recruits enter the Navy in either a GENDET or a rated program, they do not necessarily reach full duty in the same program. For example, GENDET recruits may be reassigned to A-school before reaching full duty. Or A-school recruits may not complete A-school and may enter the fleet as GENDETs. Figure 19 shows the percentage of sailors who entered full duty in a different program from the one for which they were recruited. Ignoring 2006 through 2008, when there were too few GENDETs to make any meaningful judgment, we observe that before that period a small but meaningful percentage of GENDETs ended up completing A-school before reaching full duty. Since 2009, virtually all GENDETs remained GENDETs before entering the fleet.

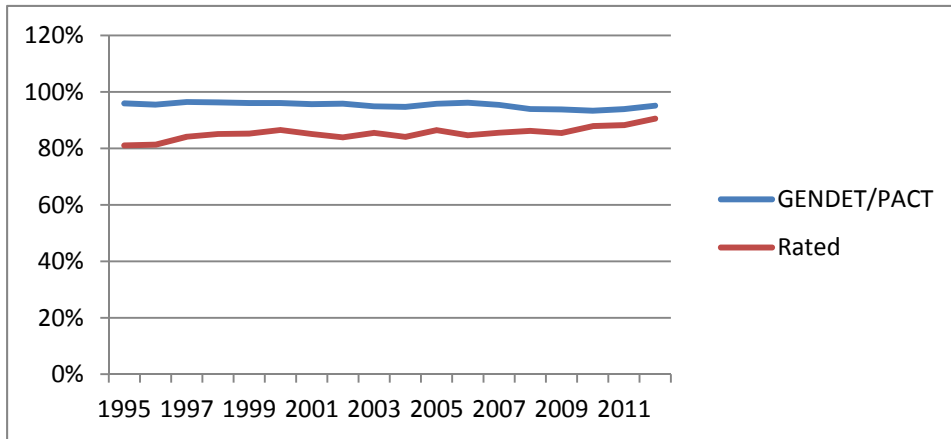
Figure 19. Percentages of recruits reaching full duty in different program



There was a related trend for recruits entering ratings. Before 2005, an average of 17 percent of recruits entering rated programs ended up as GENDETs. Since 2005, the percentage has declined, averaging only 6 percent.

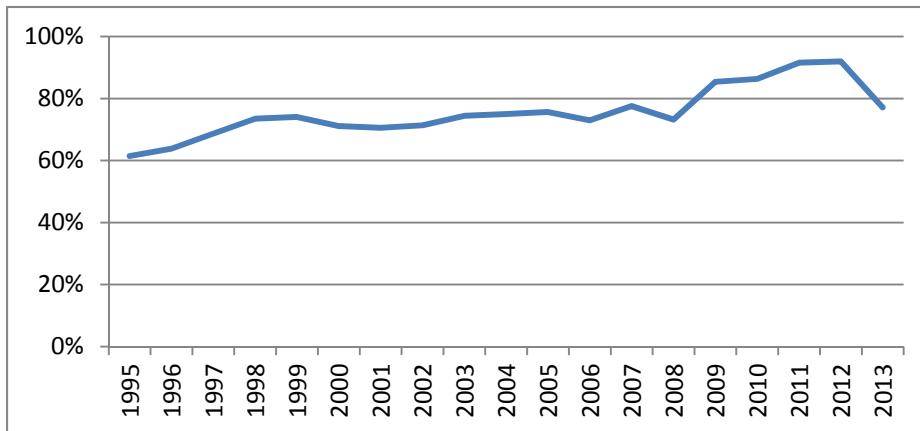
Another important metric is completing the enlistment once the sailor has achieved full duty status. We compared the trends of sailors completing 36 months of service. Sailors who finish 3 years of service have performed enough service after training to provide a positive benefit to the Navy. Figure 20 shows the percentage of GENDET and rated sailors who have completed 36 months of service after reaching full duty. Both groups have experienced increasing continuation rates from 1995 to the present, reaching more than 90 percent by 2012. GENDETs and PACTs have consistently had higher continuation rates once they have reached full duty.

Figure 20. Percentages surviving 36 months



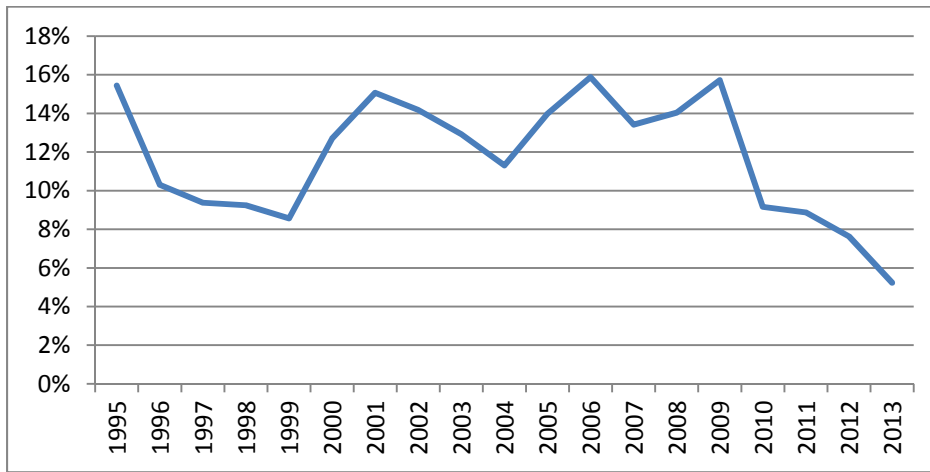
An important factor for GENDETs and PACTs is becoming rated. Figure 21 shows the percentages of GENDETs and PACTs who have become rated during their enlistment. Since 1998, over 70 percent of GENDETs became rated during their enlistment. Since the PACT program became operational, over 90 percent of GENDETs have gone on to become rated.

Figure 21. Percentages of GENDETs and PACTs rated



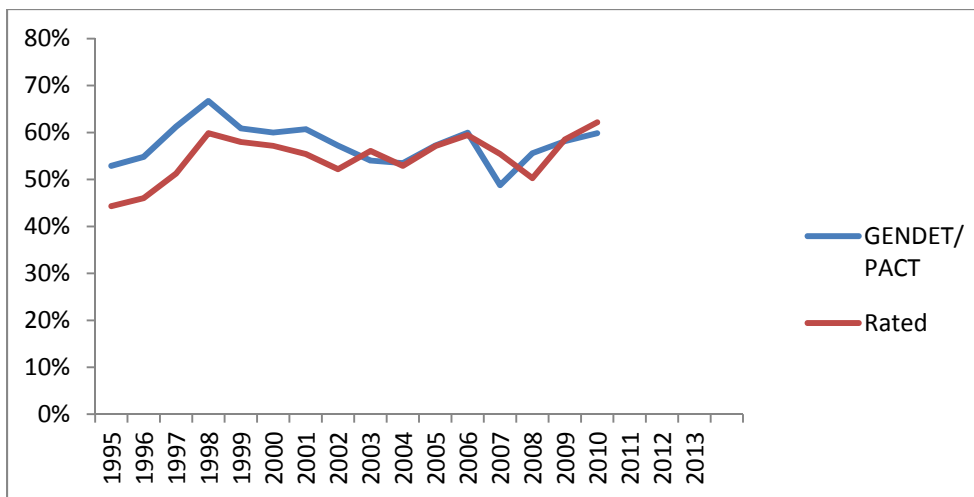
In addition to becoming rated, an important consideration is *how* GENDETs or PACTs become rated. To measure the number of recruits who became rated through A-school, we identified GENDET and PACT sailors who attended A-school within 3 months before being rated. Figure 22 shows the trend over the last 20 years. Roughly 12 percent of rated GENDETs attend A-school to get rated. This percentage has declined somewhat since the PACT program has been in place. Since 2010, only about 9 percent of the PACT sailors were rated through A-school, despite the higher proportion becoming rated.

Figure 22. Percentages of GENDETs and PACTs rated through A-school



One final consideration for enlisted programs is the number of sailors who continue to serve after completing their enlistment. To measure this, we compared the number of sailors who completed their enlistment and remained in the Navy one year later. Figure 23 displays the percentages who continued from four to five years. Roughly one-half of sailors continue beyond four years. The retention rates of GENDETs and rated sailors track closely with each other, although GENDETs were slightly higher before 2003. Since the PACT program has been in place, the retention rates have been nearly identical at around 60 percent.

Figure 23. Percentages rated one year after completing enlistment



A model of performing undesignated work

The Navy has used three different methods of performing first-term work:

- Recruitment of sailors into ratings to perform both undesignated and designated work
- Recruitment of sailors into undesignated assignments
- Recruitment of sailors into undesignated assignments with transition into designated work

In the first approach, a recruit enters the Navy, goes through both recruit and A-school training, and then reaches full duty status in the fleet. This probability is labeled C_t , the probability of completing training. Once they have achieved full duty, they perform work that is in their rating, as well as undesignated work. Some may attrite before completing their enlistment, but most will complete their initial enlistment. This probability is labeled C_e , the probability of completing the initial enlistment.

The Navy relies on retaining many of these sailors to become the journeymen and leaders of its force, so an important factor is the number retained beyond their initial enlistment. At the end of their enlistment, the Navy will require many of them to continue to serve. This factor is labeled C_s , the probability of continuing to serve.

Currently, PACT sailors enter training, which includes both recruit training and a short Seaman, Fireman, or Airman course before beginning full duty in the fleet. A similar probability, that of completing training, C_t , also applies to PACT sailors. And C_e , the probability of completing the enlistment, applies as well.

For PACT sailors, there is an additional factor—the probability that a PACT sailor becomes rated. Most PACT sailors end up being rated either through formal A-school training or on-the-job training. So we identify an additional factor for undesignated sailors—the probability P_r that they become rated during their enlistment. Sailors who do not become rated, but remain in full duty, complete their enlistment performing unrated work.

PACT sailors who become rated are also candidates for retention. So the probability that they remain on active duty beyond the end of their enlistment, C_s , is also an important factor for these sailors.

In addition to the probabilities of sailors reaching different productive states during their enlistment, the time they spend in different categories is important for assessing the impacts of different undesignated work programs. We also identify the average times spent in training and in full duty. For example, T_t is the time spent by

the sailor from entering the Navy to reaching full duty. This factor applies to both PACT sailors and sailors recruited into ratings.

For sailors recruited into ratings, the time spent doing productive work is the time between the length of their enlistment and the time remaining in their enlistment after completing training. For example, if a recruit enlisted for 48 months and spent 6 months in training before reaching full duty, he or she would have had 42 months, T_r , performing rated work. A PACT sailor who also enlisted for 48 months and spent 4 months in training, and remained unrated for the remainder of his or her enlistment, would have had 44 months performing undesignated work, T_u .

For the majority of PACT sailors, there are three time factors:

- Time in training— T_t
- Time in full duty performing unrated work— T_u
- Time in full duty performing rated work— T_r

For PACT sailors, we track not only the time it takes them to reach full duty, but also the time they spend in both rated and unrated work. Since most PACT sailors become rated, they also spend a portion of their enlistment performing rated work. The allocation of time spent in these two states is important for understanding their role in meeting the work requirements for ships and squadrons.

Analysis of the performance of undesignated work

We analyzed two alternatives for performing undesignated work:

- PACT sailors
- GENDET sailors

First, we investigate the PACT program. PACT sailors are currently used to perform undesignated work in the Navy. We follow PACT sailors and sailors accessing into ratings during the same time period. To improve comparison between PACT sailors and ratings accessions, we restrict both groups to four-year enlistments and the ratings into which PACT sailors typically transition.

We tracked recruits who entered the Navy from FY 2010 to FY 2012. These years were the first years of the PACT program that included recruits into all three PACT programs: Airman, Seaman, and Fireman. Also, this cohort could be followed through at least the first three years of their enlistment.

Table 4 shows the continuation parameters for the PACT and ratings program recruits from this period. We observe that PACT sailors had high continuation rates through training and their first enlistment. Also, this cohort could be followed through at least the first three years of their enlistment. Nearly 60 percent who completed their enlistment remained in the Navy one year later. In contrast, ratings program sailors have somewhat lower continuation rates but a retention rate 2 percentage points greater than that of PACT sailors.

Table 4. Career path behavior of GENDETs, PACTs, and rated sailors

	2002-2004 GENDET	2010-2012 PACT
GENDET/PACT rates		
Probabilities		
Probability reaching fleet	86.8%	87.1%
Probability completing 3 years	95.1%	94.4%
Probability of rated	73.7%	91.1%
Probability of retaining	54.7%	59.9%
Time to full duty (months)		
Time to full duty (months)	3.9	3.5
Time to rate (months)	15.7	15.6
A-school rates		
Probabilities		
Probability reaching fleet	85.7%	86.6%
Probability completing 3 years	84.5%	88.9%
Probability of retaining	53.7%	62.2%
Time to full duty (months)		
Time to full duty (months)	6.4	5.7

We also show the time that the two groups of sailors spent performing work. PACT sailors reached full duty in 3.5 months on average, while A-school recruits took nearly 6 months. PACTs spent less than 16 months doing undesignated work, on average spending more time as a designated sailor—about 29 months.

For comparison, we included the performance of recruits from 2002 to 2004, which was a recent period when the GENDET program was being used by all three ratings: AN, FN, and SN. The continuation behavior of A-school recruits was lower than both PACTs and GENDETs. GENDETs and PACTs experienced similar rates of reaching full duty. However, fewer GENDETs than PACTs became rated. GENDETs did spend

similar times reaching full duty and becoming rated. A-school recruits spent longer in training than PACTs or GENDETs.

Table 5 shows the outcome from the behavior of the 2010-2012 cohorts. PACT sailors produce more months of full duty work than rated recruits, owing to both their shorter training times and their somewhat higher continuation rates. However, PACT sailors were producing less than half their work as undesignated sailors. Both PACT and rating recruits resulted in similar numbers of sailors retained past the end of their enlistment.

Table 5. Numbers of sailors and work produced per 100 recruits

	2002-2004	2010-2012
GENDET/PACT recruits	100	100
Number reaching fleet	86.8	87.1
Number completing 3 years	82.5	82.3
Number rated	60.8	74.9
Number retained	33.3	44.9
Months in rated work	1,727	2,167
Months in unrated work	1,914	1,505
Total months of work	3,641	3,672
A-school recruits	100	100
Probability reaching fleet	85.7	86.6
Probability completing 3 years	72.4	77.1
Probability of retaining	38.9	47.9
Months in rated work	3,008	3,261

The GENDET recruits produced about the same number of months of productive work as their PACT counterparts. The most significant change between the GENDET and PACT programs was the increase in rated work by PACT recruits. PACT sailors were more likely to get rated than GENDETs. While they produced about 20 percent fewer months of undesignated work, they produced about 27 percent more months of rated work. A-school recruits produced about 8 percent fewer months of rated work during the GENDET period than during the PACT period.

Cost analysis

There are two important resources for preparing sailors to perform work: recruiting and training. Recruiting costs are associated with three broad categories: recruiters, advertising, and incentives.

Recruiters make up the largest component of variable recruiting costs. The time and effort expended by recruiters is largely tied to the quality of the recruit's background. Recruits with high aptitude scores who completed high school require the most effort. Recruits with below-average test scores and without a high school diploma do not require as much recruiter effort.

Advertising budgets are focused on recruiting high-quality recruits. They account for \$2 to \$4 per high-quality recruit. Enlistment bonuses are the third major component of recruiting costs. About 10 percent of recruits, nearly all of them high quality, receive enlistment bonuses. The Navy has a model, E-PRO, that it has used to generate recruiting resource requirements [15]. We obtained the variable numbers for recruiter effort from E-PRO for 2008 and inflated them to 2015 dollars.

The costs for recruiting high school diploma graduates (HSDGs) into ratings by AFQT score were as follows:

- HSDG, AFQT 65-89: \$23,100
- HSDG, AFQT 50-64: \$16,500
- HSDG, AFQT 35-49: \$11,000

For the typical recruit into one of the PACT flow ratings, the FY 2012-2014 quality was 88 percent in the AFQT range of 50-89 and 12 percent below 50. We included recruiter effort and advertising in determining the cost of recruiting candidates to fill ratings. This mixture produced an average recruiting cost of \$18,700. The same recruiting cost figure was used for both the 2002-2004 and 2010-2012 cohorts. We did not include any bonus costs since recruits currently are not receiving enlistment bonuses for these ratings.

Sailors recruited into PACT ratings fall in the lowest range of recruiter effort. They do not require significant recruiter effort or bonuses and are not the target of advertising. Based on discussions with recruiting SMEs, their marginal recruiting costs were \$6,600. Again, we used the same marginal recruiting costs for both the GENDET and PACT recruits, although the PACT recruits were of substantially higher quality.

We consider both recruit training and A-school training as part of the development costs for sailors. We obtained estimates of training costs [16]. This document

provided costs of staff time, materials and services, costs for maintaining training departments, civilian labor, and student pay and allowances. We inflated the costs to FY 2015 dollars. For recruit training, the costs were the same for all recruits. The cost in FY 2015 dollars was \$13,300.

The training data were broken out by A-school for many Navy ratings. However, not all ratings were present in the Naval Education and Training Center (NETC) data, and the length of training had changed for some courses. We developed a regression model, based on the cost data for the traditional PACT ratings, inflated to 2015 dollars. We used a simple linear model, with an R-squared of 0.70 for 26 ratings. We used this model to generate the estimated cost per recruit for the current course length. The average training cost for the PACT ratings was \$16,300.

The cost of A-school training is applied to two groups: (1) all recruits who enter A-school programs and (2) those PACT recruits who later attend A-school. We found that about 8.5 percent of PACT recruits who became rated did so through attending an A-school during their initial enlistment.

Table 6 shows the variable costs per 100 recruits broken out by PACT and A-school recruits, along with the months of productive service. A-school recruits cost more: about \$4.7 million, or \$46,700 per recruit, compared with about \$2.6 million, or \$26,000 per recruit, for PACT sailors. The PACT sailors produced comparable months of productive service, and the number retained past their first enlistment was similar. The issue with PACT recruits is the nature of the work they produce. PACTs generate more months performing designated work than undesignated work.

Directly comparing the PACT program with the GENDET program is hampered by the very different economic conditions in the two eras. We found that the two programs produced similar amounts of work, but that retention was improved in the era of the PACT program. The retention difference could be related to program differences, but it also could be the result of the recession that coincided with the 2010-2012 retention behavior of PACTs.

Table 6. Costs and outcomes, PACT versus A-school (2010-2012)

	PACT	A-school
Recruits	100	100
Recruiting costs	\$660	\$1,870
Training costs		
Recruit training	\$1,330	\$1,330
Initial skill training	\$543	\$1,465
A-school (PACT)	\$101	
Total costs	\$2,634	\$4,665
Work		
Months in rated work	2,167	3,261
Months in unrated work	1,505	
Total months of work	3,672	3,261
Sailors retained	45	48

Discussion

Our analysis of the costs and effectiveness of the undesignated work programs provides the following observations. First, strictly on the basis of cost per time worked, PACT sailors are more cost-effective than A-school recruits for the same ratings. While it is likely that recruiting costs are currently less than those experienced from the historical period we analyzed, we did use a lower level than the average experienced. And the fact that PACT sailors cost less to train and spend more time in full duty would enable them to be more cost-effective even if recruiting costs were identical.

One consideration is that PACT sailors produce the majority of their work in ratings rather than undesignated jobs. So while they may be cost-effective in producing more months of total work, there may be significant requirements for undesignated work that remain to be filled. Unless more PACT sailors are recruited, or PACTs perform undesignated work longer, the undesignated work requirements would be met by rated sailors in any case.

Very few GENDETs or PACTs appear to be attending A-school, and that percentage has decreased to less than 10 percent since the PACT program was implemented.

Increasing the number of PACT sailors appears desirable in the macro cost-effectiveness sense; however, our historical analysis finds that PACTs and GENDETs do not necessarily produce as much undesignated work as billet manning may desire.

Issues With the PACT Program

The PACT program was supposed to address the deficiencies of the old GENDET program while providing an adequate labor force to perform the undesignated work requirement. In this section, we look at the perceived problems with the PACT program and discuss proposed changes. Since its standup, however, the PACT program has had problems similar to those of its predecessors. There continues to be fleet and sailor dissatisfaction with the PACT program. Sailors want to be rated as soon as eligible, and the fleet wants PACT manning to improve. The continued low PACT fill rates, which are computed by measuring inventory to BA, have exacerbated the problem—especially for A-PACT where fill remains below 70 percent. Why is PACT manning a problem?

Causes and effects

The PACT manning issue is rooted in several areas. First, there is no stable demand signal to plan to as EPA and BA continue to grow for AN and FN PACT paths. This means Navy planners are in a continual EPA chase. An EPA chase often results in manning shortfalls as accession plans shoot behind the unplanned increase in EPA. The shortfall will continue until the recovery time is achieved. The problem is that, for these paths, the EPA has continued to increase and the recovery time has never been attained.

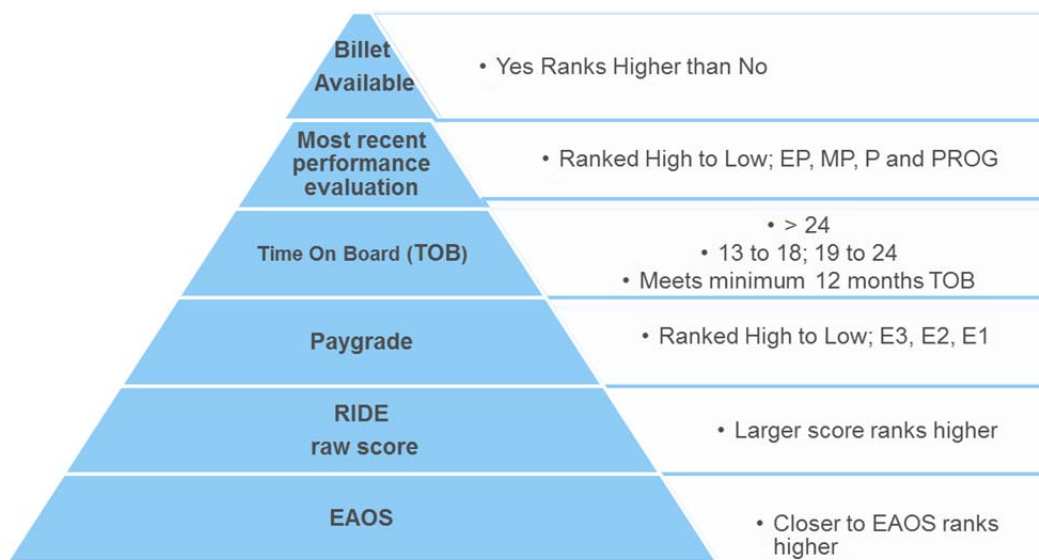
Second, the Navy has used the PACT program as an endstrength safety valve. Accession planners defer accessing part of the PACT requirement until the end of the recruiting cycle to ensure that they meet Navy endstrength targets set by Congress on September 30. If they are expected to overshoot the target, they can decrease the PACT accessions; if they expect to fall short of the target, they can increase PACT accessions. Owing to the lack of approved budgets to plan to over the last five or six years and the lack of a clear demand signal on endstrength numbers, this safety valve has been key for Navy planners. Because PACT sailors do not have extensive training pipelines and do not affect the supply chain to a large degree, they are the perfect mechanism to use for endstrength management. However, these decrements to PACT accessions and deferments in the recruiting cycle lead to fill gaps at sea.

Third, the program itself needs adjustment. Our data show that PACT sailors, on average, are rated at 14 months. However, the Navy initially set the PACT refresh metric at 24 months. This alone allowed for a significant shortfall in PACT inventory.

Realizing that this mismatch resulted in a gap between undesignated work and the labor force, the Navy recently reset the refresh metric to 18 months. This still results in a mismatch and allows for shortfalls in the PACT inventory. The Navy is trying to mitigate this mismatch by using PACT rating levers—reducing RED quotas and increasing NWAE and A-school quotas, which result in increased PACT time.

These issues have caused significant churn for the planners and PACT sailors, resulting in PACT manning issues and inconsistent PACT distribution. They also created an optics problem for the fledgling program, causing top Navy leadership to express dissatisfaction. This dissatisfaction culminated in the demand by both Surface and Air Forces to stand up a PACT working group to improve the program. In late 2014, the Chief of Naval Personnel stood up a PACT Working Group directed to improve inventory and PACT sailor opportunity. The result was a program update in September 2015, mandating that sailors have a minimum of 12 months' TOB before designation. Figure 24 illustrates the PACT rack-and-stack algorithm with the TOB modification.

Figure 24. PACT rack-and-stack hierarchy



The PACT working group leadership believes that setting a TOB minimum will increase PACT inventory and reduce inventory volatility. Others on the working group, however, thought that the PACT program needed to be further modified. They did not believe that the 12-month minimum would fix the inconsistent demand signals for PACT sailors, the unreliability of PACT accessions, and the constant

report on board churn that doubles and triples the on-the-job-training (OJT) requirements for ship's crew. Regrettably, the working group concluded in December 2015 after making these changes to the program but leaving both Type Commander staffs dissatisfied.

TYCOM recommendations

COMNAVSURFOR (CNSF) staff indicated they would like to see a return to a GTEP-like program. This would limit the number of ratings that a PACT sailor could choose from to a grouping [8]. They recommended that these rating groups be no larger than three ratings to limit the OJT churn for these sailors and the platform crews. They further suggested that the program be limited to one rating, but felt that this would be too big a change at this time. CNSF staff cited the Navy's Sailor 2025 Ready Relevant Learning (RRL) initiative as an example of this GTEP-like PACT program that would be in keeping with the direction of the Navy. The Navy's RRL proposes breaking up initial training for rated sailors into sections that are delivered when the sailor is ready to achieve the next milestone in his rating. CNSF staff also expressed concerns over the requirements process. They felt that the process needed improvement and that NAVMAC needed to account for the OJT churn to ship that PACT sailors generated in the NRMS. Further, they felt that to continue to use only Condition III at-sea steaming posture to determine ship class manpower requirements was in error. They recommended that NAVMAC look at the total work requirement for a platform to include all phases of the Optimized Fleet Response Plan (OFRP), citing the increasing demands on crew workload for training and maintenance, which they believe will significantly increase under RRL.

During the working group, the COMNAVAIRFOR (CNAF) staff and the NAE expressed similar concerns and proposed several possible modifications to the current PACT program. The first proposed modification was a 3-YOS program where sailors would be accessed into the Navy to perform only undesignated work and would be separated at the end of their enlistment. The 3-year time period was chosen to synchronize with the OFRP cycle and to allow these sailors to be vested for the GI Bill and the new proposed 401(k). However, this proposal was not well received because it provided no off ramps for these sailors to stay Navy. Furthermore, the vesting for the 401(k) has slipped to 5 years. So, NAE offered a modified pilot proposal with a 4-YOS contract for A-PACT sailors, still synchronized to the OFRP cycle. Synchronizing to the OFRP cycle means that A-PACT sailors would report to their respective CVN as a group during the maintenance phase of the cycle. NAE believes that having sailors arrive together reduces the overall training burden to the crew. Every PACT requires Under Instruction (UI) time for each assignment; some assignments require OJT to make up for lack of A-school and/or certifications and qualifications. Like CNSF staff,

the NAE believes that the NAVMAC Workload Analysis does not consider the UI time (burden) [17]. NAE expressed the following concerns with the current PACT program:

- The more PACT billets turn over, the more UI time is required of journeymen and supervisors. Current average billet turnover is less than 18 months.
- PACTs can leave the ship if they choose to enter a different rate.
- Sufficient numbers of personnel who can satisfactorily perform unskilled work assigned are needed.
- Personnel are needed who generate operational readiness without degrading the readiness generating capability of other aviation sailors or units as a whole (UI time is a fact of life, but excessive UI does not have to be).
- Trim back the chaos (a program that is planned, repeatable, in step with readiness, cognizant of the equity of all sailors onboard).

So what does the NAE proposal look like?

- A-PACT sailors will be “specialized” into three areas:
 - Airman S – Squadrons
 - Airman D – Deck and Air Department
 - Airman W – Weapons Department
- Initial training will be modified slightly to add a short module for the specialized area (Squadron, Deck and Weapons)
- Only a few of these sailors will be allowed to stay in the Navy after completion of initial contract
 - Stay ratio would depend on the needs of the Navy and the quality of the A-PACT sailors. (Initial planning for A-PACT retention is about 10 to 20 percent.)
 - Sailors selected to retain will:
 - Reenlist with a new set of orders, go to A-school and auto advance on completion, and then be redistributed to fleet (needs of Navy).
 - Access as E1s and only progress through to E3 until selected for retention and A-school.

To make this work for the fleet, NAE believes that these unrated sailors would need to arrive at their commands in cohorts (large groups) at set times in the OFRP cycle. Aligning cohort arrival to the CVN's post-deployment/pre-maintenance phase in the OFRP cycle means that they will have obtained maximum skills in their specialization by deployment, thus increasing crew readiness. Further, NAE believes that these cohorts would reduce the OJT and UI burden to the crew. Instead of PACT sailors being trained throughout the OFRP as they report on board, these specialized undesignated sailors would receive training in groups, thus reducing the training demand to the more senior petty officers who oversee the OJT/UI training.

NAE requested that the working group approve a pilot program for its A-PACT specialist model. The working group did not approve the pilot in its last voting session prior to its disestablishment. This has not deterred the NAE, which continues to pursue a pilot for this approach to aviation undesignated work. So, we decided to develop an optimization model to test key parameters of the NAE proposal.

Optimization Model (NAE Pilot)

At sea, there are tasks that must be performed but require no skills or special training. These undesignated work billets must be filled by either PACT sailors or freshly recruited rated sailors. Following the first sea tour, there are rated billets that must be filled by either PACT sailors who are interested in attending A-school and pursuing a career in the Navy or by those sailors who are already rated. These decisions of recruitment (i.e., how many rated sailors and PACT sailors should be recruited to satisfy the demand for undesignated work and future rated vacancies) and career continuation (i.e., how many PACT sailors should be offered A-school and a new Navy contract after their first sea tour) have significant impact on the cost and quality of the sailor community. To help inform Navy policy on recruitment and career continuation, we develop an optimization model using key parameters from the NAE proposed pilot to address the following key questions:

- How many rated sailors should be assigned to billets categorized as undesignated work on their first sea tour?
- How many A-PACT sailors should be provided the opportunity to reenlist, go to A-school, and have a career in the Navy after their initial 4-year contract?

Model methodology

We formulated the problem as an optimization model that captures the flow of sailors from recruitment through the end of their Navy careers. Sailors enter the model as either recruited A-PACT sailors or recruited aviation rated sailors. Both are recruited as E1s. The following ratings were used to derive the average aviation sailor: ABE, ABF, ABH, AD, AM, AME, AE, AT, AO, AS, and AZ.

Recruited A-PACT sailors sign a 4-year contract with the Navy under the stipulation that a percentage of them will be offered the opportunity to reenlist and go to A-school (denoted the career continuation rate). Recruited A-PACT sailors attend Recruit Training Command (RTC) and PACT training before their first sea tour. During their 36-month sea tour, A-PACT sailors may promote through E3. For those A-PACT sailors who are offered reenlistment, they are sent to A-school 36 months into their 48-month contract. They are then promoted to E4 and begin their rated Navy career.

Recruited rated sailors are sent to RTC and aviation A-school before their first sea tour. During their sea tour, rated sailors may promote through E4. At the end of the 36-month sea tour, rated sailors are allowed to reenlist as E5s at their historical retention probability. The model does not allow attrition before the end of the first sea tour for any sailor.

The model considers two demand sources: undesignated work demand on sea duty and reenlistment demand. The undesignated work demand is the total number of man-months of undesignated work that need to be done (according to the number of billets authorized for the previously listed PACT aviation ratings) during a 36-month sea tour. The reenlistment demand is the number of approved in-rate and conversion billets for the aviation ratings.

The optimization model seeks to find the optimal mix of rated and PACT sailors and the optimal career continuation rate for PACT sailors that minimizes expected discounted total cost while satisfying the undesignated work and reenlistment demand. The costs considered in the model are the recruitment and training cost plus the salary paid to each sailor.

Below we mathematically formulate the optimization model by characterizing its decision variables, objective function, and constraints. Note that the model is nonlinear due to the product of decision variables. We begin by defining the relevant sets and parameters from which the mathematical representation of the network flow is defined.

Sets:

- Type: $k \in K = \{\text{Rated}, \text{PACT}\}$
- Stage: $s \in S = \{\text{Recruit}, \text{Train}, \text{Sea duty}, \text{Career}\}$

Parameters:

- Costs: $C_{ks} \in \mathbb{R}^+$, the expected cost incurred per sailor to the Navy when a type k sailor is in stage s
- The cost at each stage is the sum of recruitment, training, and salary where applicable
- Note that for $s = \text{Career}$ the salary paid over the expected time in service (E4 through E8 for PACT and E5 through E8 for rated).
- Number of sailors: $X_{ks} \in \mathbb{R}^+$, the expected number of type k sailors in stage s
- Career Continuation: $\alpha \in [0, A]$, the proportion of A-PACT sailors to allow to go to aviation A-school and reenlist in the Navy

- A is the reenlistment rate that would occur if all A-PACT sailors were allowed to reenlist if they wanted to. lapsed Time: $t_{ks} \in \mathbb{R}$, expected elapsed time (in years) between present time (for cost discounting purposes) and the time cost C_{ks} is incurred for type k sailors in stage s
- Present time is defined as the start of the sea duty because the street-to-fleet time for A-PACT and rated recruits differs and we require a common starting time to accurately discount costs.
- For the purpose of discounting, we assume that salaries are paid as a lump sum at the beginning of each promotion. For example, the total income of a sailor during his time in grade as an E6 is paid once the sailor promotes from E5 to E6.
- Undesignated Work Demand: θ , the total number of man-months of undesignated work required during the 36 month sea tour
- Reenlistment Demand: ϕ , the total number of billets for the aviation ratings that need to be filled by reenlisted sailors
- Retention Probabilities: $P_k(s + 1|s)$, probability of a type k sailor transitioning from stage s to stage $s + 1$
- For A-PACT sailors, the retention probability between *Sea duty* and *Career* is the career continuation α .
- Interest Rate: $r \in \mathbb{R}^+$, real annual interest rate used for discounting prior and future costs

Next, we use the mathematical notation to write equations which capture the objective function (minimizing cost) and the model constraints.

Objective Function:

$$\min \sum_{k \in K} \sum_{s \in S} \frac{C_{ks}}{(1 + r)^{t_{ks}}} X_{ks}$$

The first term is the discounted cost (using interest rate r) per sailor. The second term is the number of sailors. The sum of the product of these terms over all sailor types and stages equals the total expected discounted cost.

Sailor Flow Constraint:

$$X_{k,s+1} = P_k(s + 1|s)X_{ks}$$

Demand Constraints:

$$\begin{aligned} \sum_{k \in K} X_{ks} &\geq \theta \quad \text{for } s = \text{Sea duty} \\ X_{ks} &\leq \theta \quad \text{for } k = \text{PACT}, s = \text{Sea duty} \\ \sum_{k \in K} X_{ks} &\geq \phi \quad \text{for } s = \text{Career} \end{aligned}$$

Decision Variables:

Given the flow and demand constraints and the objective function, we next determine which parameters the model is allowed to change in order to achieve the objective function without violating the constraints. Since our model is developed to provide the mix of A-PACT and rated sailors to recruit, our first decision variable is *number of sailors*:

$$X_{ks} \in \mathbb{R}^+ \quad \text{for } k = \text{the number of A PACT rated sailors to recruit}$$

Our model also answers the question of how many PACT sailors should be given the opportunity to go to A-school and reenlist. Our other decision variable is *career continuation*:

$$\alpha \in [0, A], \text{ the proportion of A-PACT sailors to allow to go to aviation A-school and reenlist in the Navy}$$

Data sources

To solve this model, we require data to parameterize all of the variables that are not decision variables.

Recruitment and training costs for A-PACT and rated sailors come from Navy Recruiting Command past estimates. Salaries come from the 2015 paygrade table. The total salary paid out is based on the average time in grade and promotion rate.

Elapsed times for each stage are based on the average street-to-fleet time and the average length of RTC, PACT training, and aviation A-school.

The undesignated work demand is estimated using the average total number of PACT billets authorized for the studied aviation ratings between 2010 and 2016. The average total is then multiplied by 36 months to determine the demand during the Sea duty stage.

The reenlistment demand comes from the average number of billets approved for in-rate or conversion for the studied aviation ratings between 2011 and 2015.

The retention probability for rated sailors between Sea duty and Career is calculated as the average survival probability of a sailor entering as an E1 and making it to E5. The retention probability for A-PACT sailors between Sea duty and Career is the decision variable α , the career continuation.

We assumed a 1.2-percent real annual interest rate, in accordance with Appendix C of OMB's Circular A-94, assuming a 20-year horizon.

Solution algorithm

The nonlinear optimization model was solved using an evolutionary algorithm. The algorithm initiates with a solution and then mutates the solution (by changing the number to recruit and the career continuation rate) to find improved solutions. Once the algorithm is unable to find improved solutions, the best solution found is reported. While not guaranteed to yield the globally optimal solution, evolutionary algorithms have a strong record of returning near-optimal solutions.

Results and discussion

Analysis of the minimum cost solution to the optimization model provides answers to the following questions:

- How many rated sailors should be assigned to billets categorized as undesignated work on their first sea tour?

Answer: If the retention rate of rated sailors is less than the maximum career continuation rate for PACT sailors, undesignated work should be performed by PACT sailors only.

- How many A-PACT sailors should be provided the opportunity to reenlist, go to A-school, and have a career in the Navy after their initial 4-year contract?

Answer: Any PACT sailors who want to reenlist and become rated should be allowed to do so.

The intuition behind the answers is as follows. Rated sailors are more expensive than A-PACT sailors before their reenlistment because of higher recruitment and training costs. This implies that, to minimize cost, undesignated work should be performed by A-PACT sailors. However, if A-PACT sailors have a low probability of reenlistment (either naturally or by choice of the career continuation rate), there will be reenlistment demand that will be unmet in the Career stage. While the A-PACT sailors will satisfy the undesignated work demand, the Navy incurs the recruitment, training,

and sea duty cost of A-PACT sailors without the benefit of those sailors satisfying future demand (E4 and above). This future demand will need to be met by recruiting more rated sailors who come with a steeper price tag. Therefore, it is in the best interest of the Navy to have A-PACT sailors perform undesignated work and to encourage those sailors to reenlist in the Navy to satisfy the future demand for rated work.

These results also reflect qualitative features of the problem that are important to Navy decision-makers. While not formulated in this model, requiring a rated sailor to perform undesignated work may result in a lower retention probability. These sailors have been recruited and trained with the assumption that their skills will be fully utilized during the sea tour. Assigning a rated sailor to undesignated work would be not only a waste of skilled labor but also more costly to the Navy.

Note that the Career cost of A-PACT sailors is larger than that of rated sailors. The design of the studied 4-year contract prevents A-PACT sailors from promoting beyond E3 before 36 months of service. Therefore, when the A-PACT sailor goes to A-school and promotes to E4, the sailor will begin his/her Career stage as an E4 with over 3 years of service. For recruited rated sailors, the average aviation rated sailor has 2.2 years of service before promotion to E4. The rated sailor begins his/her Career stage as an E5 with over 3 years of service. Comparatively, by delaying promotion, the A-PACT sailor will promote to each paygrade at a higher year-of-service level, which translates to a higher expected total salary over his/her reenlistment and career.

Forecasted Requirements (REQ)

OPNAV N81 asked CNA to forecast the Navy's undesignated work requirements through 2025. To do that, however, we must determine what to use as the requirement. As stated earlier, determining undesignated work requirements is complicated and depends on where one sits in the MRD process. If using the Navy's NEOCS guidelines, the Navy's true undesignated work requirements would be represented by all E1-E3 SMD requirements as recorded in TFMMS. Yet, even if we were to use the E1-E3 requirements, we know that the Navy does not authorize (buy) 100 percent of the TFMMS requirements. The Navy's decision to buy less of the determined requirement results in a gap between requirements and authorizations (see Figure 25). To best represent the Navy's future obligation for undesignated work, we forecasted both the REQ and BA. As Figure 25 and Table 7 show, we have provided a linear forecast for both E1-E3 REQ and BA through 2025. The forecast was computed using time series linear forecasting. We were able to predict the values for 2023 through 2025 using the existing values for REQ and BA for 2016 through 2022.

Figure 25. Forecasted E1-E3 requirements and BA

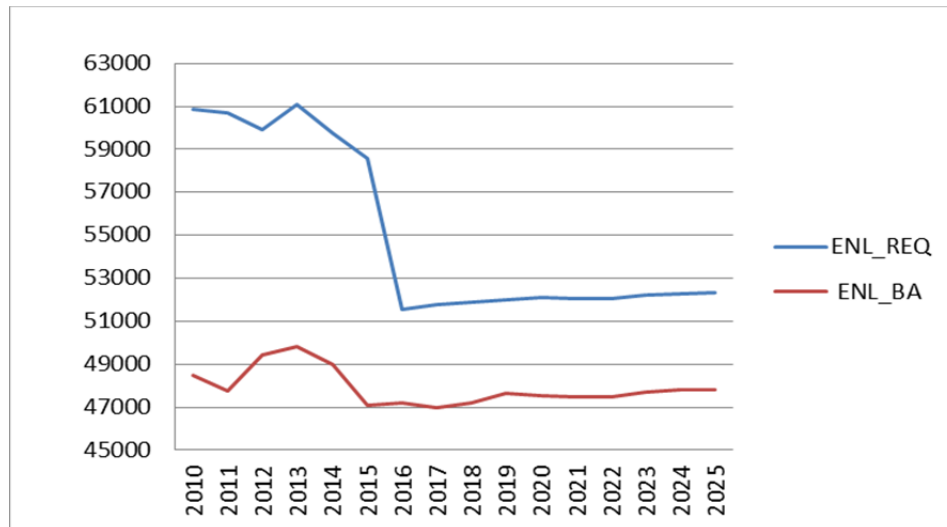


Table 7. Forecasted REQ and BA through 2025

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
REQ	51,567	51,771	51,859	52,002	52,119	52,044	52,044	52,235	52,268	52,313
BA	47,177	46,981	47,190	47,652	47,558	47,489	47,489	47,694	47,804	47,819

Under this logic, the Navy's undesignated work requirements would be 52,313 billets in 2025 with the Navy authorizing approximately 91 percent of the requirements, or 47,819 billets. As we have discussed previously, however, the Navy allocates much of the undesignated work requirements to rated requirements due to policy, paygrade distribution, community health, and other factors. Therefore, to more accurately predict what the Navy accepts as the undesignated work requirement, we computed an E1-E3 AN/SN/FN forecast for REQ and BA using the same technique. Figure 26 and Table 8 show the forecasted requirements for E1-E3 AN/SN/FN (PACT) REQ and BA through 2025.

Figure 26. Forecasted PACT REQ and BA

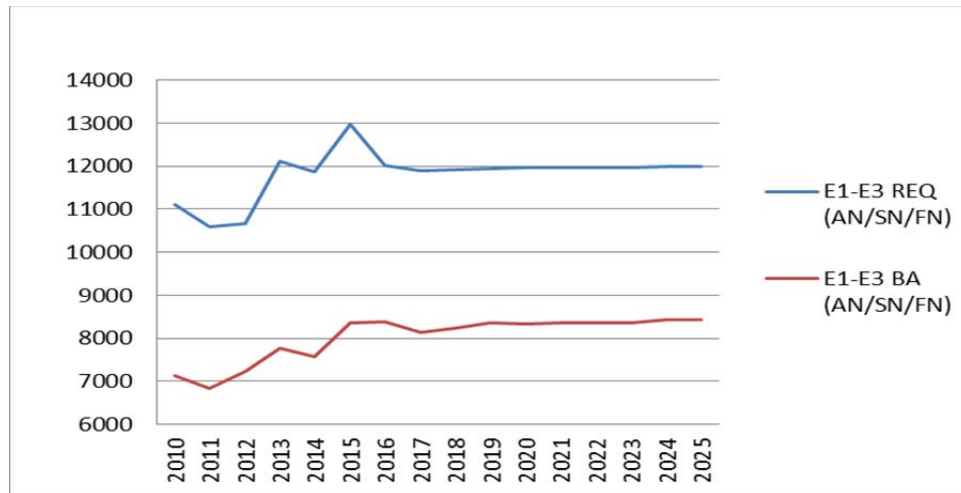


Table 8. Forecasted PACT requirements

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
REQ	12,007	11,891	11,916	11,947	11,975	11,966	11,966	11,965	11,995	11,999
BA	8,395	8,147	8,239	8,367	8,343	8,352	8,352	8,369	8,435	8,437

For this forecast, the Navy's undesignated work requirements would be 11,999 billets in 2025 with the Navy authorizing approximately 70 percent of the requirements or 8,437 billets. The drop in authorizations is not unexpected. As discussed earlier, the Navy tends to take higher risks for unrated requirements than it does for rated,

meaning that it authorizes or buys less. Knowing that the Navy tends to buy less of the requirement for aviation than it does for surface requirements, we broke down the forecast for each of the PACT cohorts to see if this held true. Table 9 shows that this does hold true in our 2025 projections with the Navy authorizing only 69 percent of the REQ for AN, 72 percent for SN, and 82 percent for FN. As we can see, the forecasted REQ and BA remain fairly steady with minor increases and decreases across the FYDP and out-years. This is not unexpected since there is usually little variation in the predicted TFMMS data; however, as past years have shown us, this static prediction does not normally hold true because of changes in the Navy's budget, endstrength, and platform buys.

Table 9. SN/AN/FN REQ and BA forecasts

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
SN REQ	5,181	5,125	5,144	5,173	5,200	5,212	5,212	5,224	5,252	5,265
SN BA	3,771	3,589	3,651	3,751	3,733	3,745	3,745	3,757	3,808	3,812
AN REQ	5,636	5,600	5,605	5,607	5,607	5,585	5,585	5,578	5,577	5,568
AN BA	3,680	3,641	3,659	3,673	3,666	3,661	3,661	3,662	3,668	3,664
FN REQ	1,190	1,166	1,167	1,167	1,168	1,169	1,169	1,163	1,166	1,166
FN BA	944	917	929	943	944	946	946	950	959	960

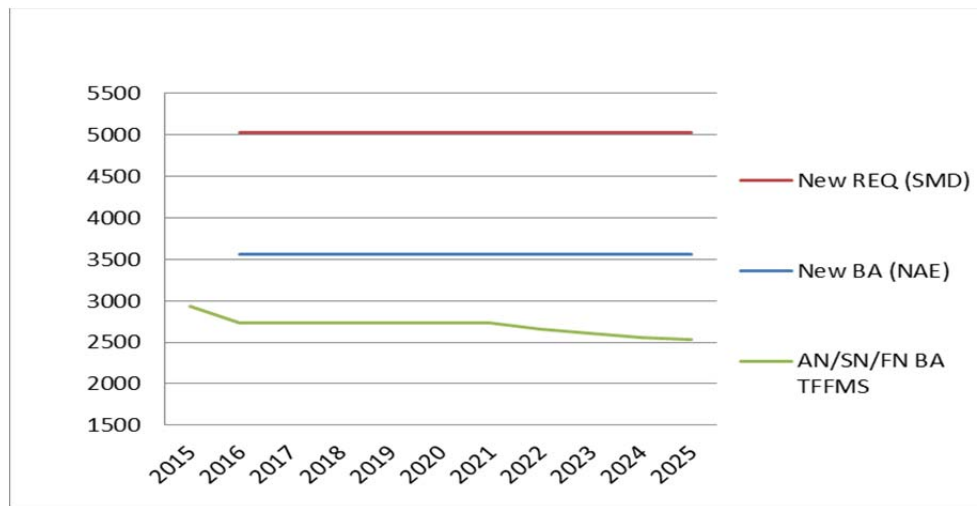
SMD updates can also cause the TFMMS values to change. For instance, NAVMAC has completed a new SMD for the Nimitz-class carriers and a Prospective SMD (PSMD) for the Ford class. These new SMDs have not been entered in the TFMMS file as of yet, so the FYDP and out-year numbers are incorrect. Therefore for resource planning, the NAE is using the new SMDs. The NAE has factored in 10 Nimitz-class carriers and 1 Ford-class carrier against these new SMD requirements. Table 10 shows NAE's expectations for authorizations and requirements for the future.

Table 10. CVN updated requirements

CVN	CVN Nimitz			CVN Ford		
	AN REQ	SN REQ	FN REQ	AN REQ	SN REQ	FN REQ
CVN REQ	349	70	45	278	77	32
# of CVNs	10	10	10	1	1	1
Total REQ	3.490	700	450	278	77	32
CVN AUTH	242	57	18	278	77	32
# of CVNs	10	10	10	1	1	1
Total AUTH	2.420	570	180	278	77	32

Using these parameters, we estimate that the total PACT requirements for CVNs would be 5,027 billets, with the NAE authorizing approximately 70 percent, or 3,557. Using 2016 as the start year and holding the new REQ and BA steady against the forecasted TFMMS BA, we observe a significant difference in out-year expectations. Figure 27 illustrates this difference. There is an average of 885 more authorizations under the new requirement than under the previous SMD. In 2025, there would be approximately 1,030 more CVN billet authorizations than previously forecasted.

Figure 27. CVN forecast with new SMDs



In another example, NAVMAC has been working new surface platform SMDs to reflect the reversal of the optimal manning initiative [8]. The last piece of the reversal is the apprentice requirements. NAVMAC estimates that each affected cruiser, destroyer, and amphibious ships will see an estimated increase of 10 to 14 billets. Unless otherwise directed by TYCOMs or the fleet, NAVMAC will default to this BA increase to undesignated requirements or SN. This would equate to an approximate 1,400 increase in Seaman-PACT (S-PACT) requirements. However, discussions with the TYCOM indicate that approximately 20 percent of these requirements would be traded for skilled sailors or rated buys. Further, the TYCOM will likely buy only 92 to 95 percent of the requirement vice the 97-percent buy rate for rated work. Therefore, the expected increase would be approximately 938 S-PACT BA, which is not reflected in the TFMMS forecast provided in Figure 27.

Therefore, resource planners such as NAE use other tools to predict manpower requirements for the future. These tools (e.g., the Master Air Plan (MAP) and the Thirty-Year Shipbuilding Plan) are used to elucidate platform requirements against such factors as new platform buys, sundowning, standups, and cycled maintenance. Each of these factors can affect BA for a platform for a given year. Unfortunately, these tools are

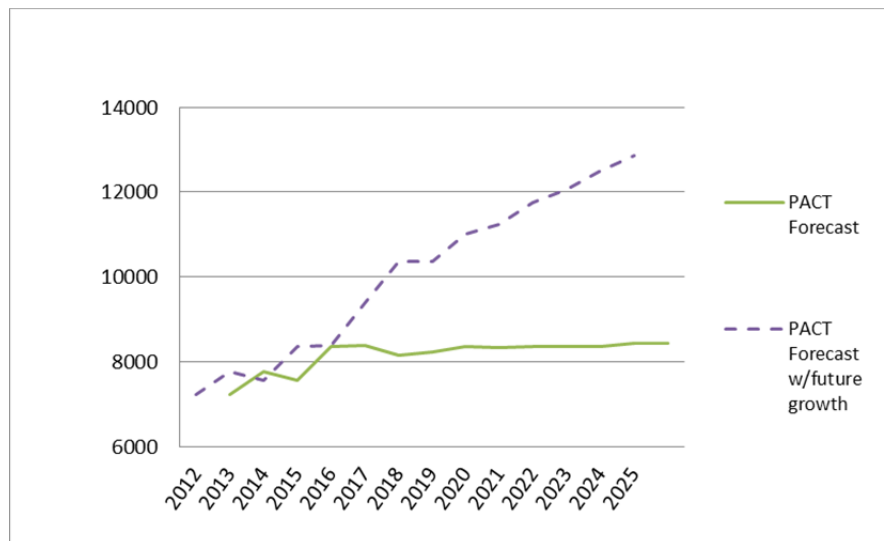
stovepiped and do not include the entire requirements picture. For instance, the MAP includes squadron and CVN requirements but does not include amphibious or surface platforms. The 30-year ship plan includes all surface platforms (e.g., carrier, amphibious, cruiser, destroyer, frigate, mine, patrol craft) but does not include squadrons. If one were to use the 30-year ship plan to forecast AN/SN/FN requirements, the result would be significantly less AN/SN/FN BA, as shown in Table 11. This is because not all units that have AN/SN/FN are included in the 30-year ship plan.

Table 11. PACT BA forecast using 30-year ship plan

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
30-year plan (BA)	6,727	6,602	6,633	6,659	6,651	6,676	7,186	7,246	7,327	7,156
TFMMS (BA)	8,395	8,147	8,239	8,367	8,343	8,352	8,352	8,369	8,435	8,437

If the SMD and CVN PACT BA changes were to be implemented into the PACT forecast, the future estimates would be significantly higher than using TFMMS (see Figure 28).

Figure 28. PACT forecast using SMD, 30-year ship plan, and MAP estimates

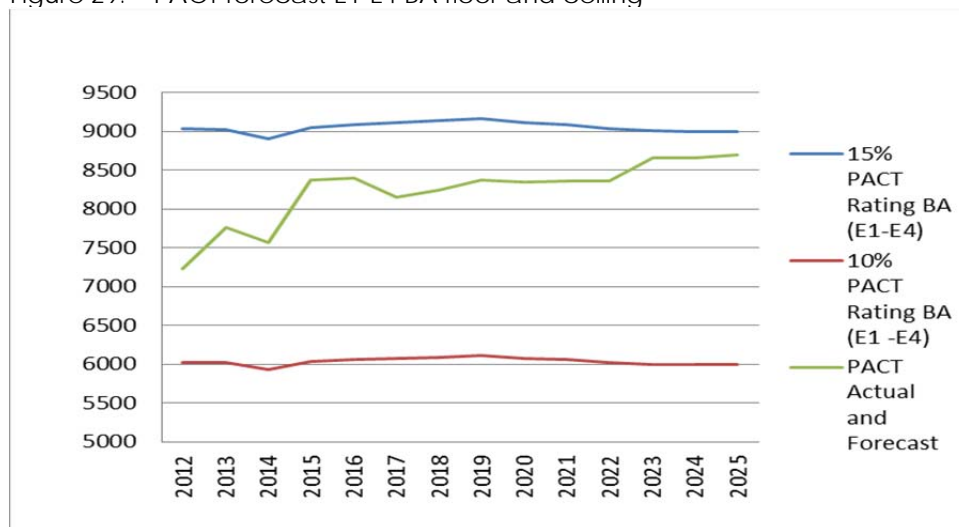


These examples highlight the issues the Navy has forecasting future Navy manpower requirements. Using TFMMS, in conjunction with the MAP, 30-year ship plan, and NAVMAC SMD updates, can improve the outcome, but unknown variables (e.g.,

budget cuts) will still require the Navy to make near-term and out-year adjustments. These unknowns will and do affect the planning forecast—more so in recent years with budget cycles happening annually.

Furthermore, through the years, SN/AN/FN BA has borne the brunt of budget cuts and endstrength reductions. They have the shortest recovery time, meaning they are not difficult to recruit to and they have the shortest training pipelines. In fact, many believe that the Navy should use these billets as a safety valve. However, this makes planning difficult and, although these billets have some elasticity, the short 18- to 24-month time horizon of a PACT sailor makes the demand signal churn undesirable and results in manning shortfalls or overages. Therefore, it is recommended that the Navy set a ceiling and floor for PACT planning. The original PACT planners set PACT BA between 10 and 15 percent of E1-E4 PACT rating BA. This was a good start and, as shown in Figure 29, the PACT BA continues to fall within the floor-to-ceiling range of the original PACT rating BA.

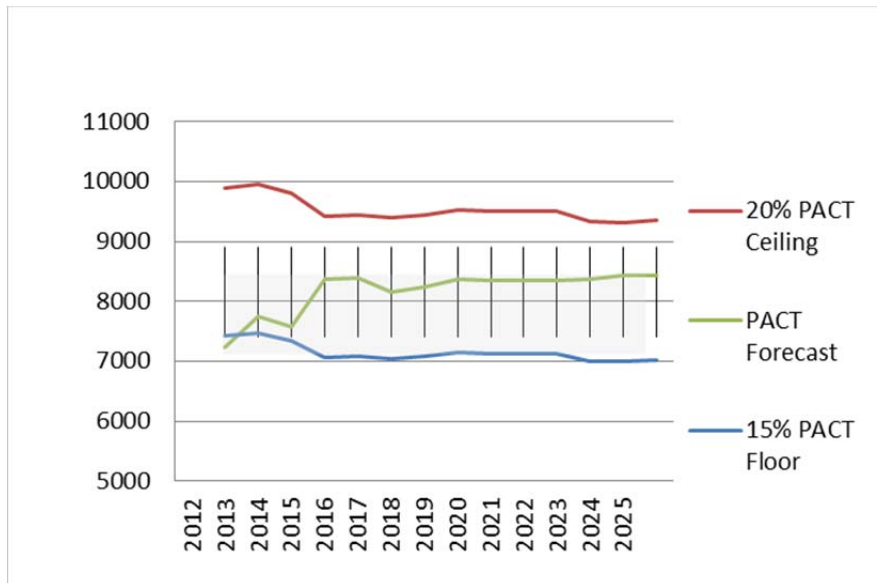
Figure 29. PACT forecast E1-E4 BA floor and ceiling



However, PACT ratings continue to fluctuate and grow. There are now 33 ratings that have PACT-in quotas—up from 28 at the program’s inception. This makes using E1-E4 PACT rating BA problematic. Inclusion of the additional five ratings’ BA would increase the ceiling to more than the TYCOMs would be willing to accept [8].

Therefore, we recommend that the Navy use E1-E3 BA as the base with a 15-percent floor and a 20-percent ceiling for future planning. This directs the proportionality to the right cohort of unskilled work and provides an acceptable range that the program has historically stayed within, as shown in Figure 30.

Figure 30. PACT forecast with E1-E3 BA floor and ceiling



How Do the Undesignated Work Programs Support Sailor 2025?

To understand how undesignated work programs fit with the Navy's Sailor 2025 initiatives, we must first understand what the Navy's 2025 initiatives are today. Three different programs generate the 2025 proposals that the Navy is tracking. These programs have spawned a myriad of ideas that are being pursued under the Sailor 2025 umbrella. Each program has generated about 20 specific initiatives, with much overlap between the programs [18]. The three overarching programs driving this effort follow:

- SECDEF - Force of the Future
- SECNAV - Task Force Innovation - Talent Management
- CNO - Sailor 2025

To lead this effort, the Chief of Naval Personnel (CNP) has divided Sailor 2025 into three pillars [19], which are described below:

1. Personnel System Modernization (PSM) - The PSM pillar's main focus is to push innovation and investment that helps the Navy to better identify and reward talent, expand choice and flexibility, and optimize total force. This pillar is looking to move away from the rigid career paths and centralized bureaucratic system to a more agile and transparent personnel system with shared information and enhanced authorities. Initiatives under this pillar fall into two categories:
 - Career Flexibility - Expanding the Career Intermission and Fleet Scholar Education Programs; SECNAV Industry Tours
 - Recognition of Performance - Meritorious Advancement Program and Officer promotions
2. Enriched Culture (EC) - The EC pillar's main focus is improving the culture of the Navy through empowerment and trust. EC initiatives seek to improve the resilience, health, and fitness of the force; maintain a family balance; and increase diversity and inclusion. Initiatives under this pillar fall into four categories:

- Culture of Fitness
 - Improved Physical Fitness Assessment (PFA) program
 - Expanded Fitness Center hours
 - Improved nutrition awareness
 - USNA
 - Establish Office of Talent Optimization at the U.S. Naval Academy (USNA)
 - Improve service assignment
 - Family Friendly Service
 - Expand Childcare Center hours
 - Dual-military Co-location Policy
 - Maternity, Paternity, and Adoption leave
 - Women in Service
 - Increase female enlisted opportunity
 - Open Special Warfare (SPECWAR) to women
 - Gender-neutral ship berthing modifications
3. Ready Relevant Learning (RRL) – The RRL pillar’s main focus is to innovate the Navy’s training programs to better provide continuous learning across the sailor’s career that results in increased fleet readiness and provides more efficient and affordable solutions. Initiatives under this pillar fall into two categories:
- General Military Training (GMT) – Services control DON-level GMT; greater flexibility in DOD-level GMT; mobile apps
 - RRL – Reduction of A-school and C-school training time

Reviewing the above initiatives, it appears that the undesignated work programs (specifically, the current PACT program and the proposed modifications) align most closely with the Navy’s Sailor 2025 Ready Relevant Learning initiative. The Navy’s RRL proposes breaking up initial training for rated sailors into sections that are delivered when the sailor is ready to achieve the next milestone in his or her rating. Further, it hopes to identify unessential training, streamline the pipelines, and defer

where appropriate. The PACT program, like its predecessors under GENDET, aligns quite well with this initiative because PACT sailors are accessed with minimal training required. Training for these sailors is either deferred until rated or waived if designated into a rating that does not require an A-school. Approximately 90 percent of PACT sailors rate without formal training.

The current PACT program also aligns with the philosophy of career flexibility by expanding designation choices. Sailors accessed under the PACT program have three pathways from which to choose: Aviation, Surface, and Engineering. Each pathway has at least 6 ratings and as many as 13 job specialties. The program also allows pathway conversions and requests for quotas for non-PACT ratings if eligibility requirements are met. This flexibility of choice is seen as key to attracting talent in today's high school graduate marketplace.

There is a concern, however, that many have with respect to RRL; they believe that the training burden will shift to the fleet. The PACT program is used as an example, citing the burden in rated petty officer man-hours required to accomplish the OJT and UI for PACT sailors. NAE and CNSF are just starting to attempt to quantify this man-hour cost. CNA concurs that the Navy needs to address these concerns and better quantify the opportunity costs of these programs to ship readiness as a measure of the training burden to other members of the ship's crew. We recommend that the Navy pursue follow-on analysis in this area.

Conclusions

Our review of the Navy's undesignated work shows that undesignated work is and always has been part of the Navy's workload. There continues to be disagreement on just how much undesignated work exists. Using the Navy's occupational standards, this work requirement could be as high as 27 percent of the Navy's entire enlisted work requirement. However, the Navy deviates from its occupational standards when distributing undesignated work during the MRD process, which results in an undesignated BA equal to about 3 percent of the enlisted workload.

During the MRD process, undesignated work is distributed between undesignated and rated requirements. The amount of work distributed to each fluctuates based on changes in policy, leadership direction, NRMS processes, and MRD inputs. A review of the MRD process showed that many constituents can lead to changes to this distribution ratio, affecting the undesignated work requirements assigned to the undesignated work program (GENDET/PACT). As a result, EPA and BA continue to fluctuate. This means Navy planners are in a continual EPA chase, which often results in manning overages and/or shortfalls as accession plans shoot behind the unplanned increase or decrease in EPA and/or BA. Furthermore, the Navy has used these programs as an endstrength safety valve, which has value to Navy budgetary planners but leads to manning challenges afloat. The Navy needs to decide if the manning risk to the fleet in undesignated work requirements is an acceptable outcome of using this program as a safety valve.

A review of past and present undesignated workforce programs found that, regardless of which undesignated work program was in effect, the same problems were perceived by the fleet and Navy personnel. We summarize the three main problems areas as follows:

- Manning issues
- Poor program execution
- Burden to fleet

Over the years, the Navy implemented various changes and improvements to address these problem areas, but it later reversed many of them due to shifting Navy policies and agendas. More often than not, the Navy had correctly identified the key issues and the best solutions, but it failed to give appropriate time for the changes to take

effect. The Navy needs to learn from the past and follow through with the program improvements to address systemic problems in the current program before moving on to any new pilot program.

Through our analysis of the costs and effectiveness of the undesignated work programs, we found that, strictly on the basis of cost per time worked, PACT sailors are more cost-effective than A-school recruits for the same ratings. One consideration is that PACT sailors produce the majority of their work in ratings rather than undesignated jobs. So, while they may be cost-effective in producing more months of total work, there may be significant requirements for undesignated work that remain to be filled. Unless more PACT sailors are recruited, or PACTs perform undesignated work longer, some portion of undesignated work requirements would be met by rated sailors in any case.

We found that, in part, the reason for this is actual program execution; sailors have been rating more quickly than planned, and planners have not matched actual rating time and refresh rates. We found during our analysis that, regardless of the program, undesignated sailors normally rate at 14 months. However, the Navy's undesignated work management programs set refresh metrics to 24 months. Realizing that this resulted in a gap between undesignated work and the labor force, the Navy recently reset the refresh metric to 18 months. This still results in a mismatch and allows for shortfalls in the PACT inventory. The Navy hopes to mitigate this mismatch by using PACT program rating levers—reducing RED quotas and increasing NWAE and A-school quotas, which result in increased PACT time.

In our analysis, we found that very few GENDETs or PACTs appear to be attending A-school, and that percentage has decreased to less than 10 percent since the PACT program began. Since most PACTs enter ratings that do not require an A-school, this is seen by the Navy as a positive trend and a cost savings. It is unclear if a readiness decrement occurs in the fleet due to the lack of formalized training for these sailors, but this issue should be analyzed if the Navy expands the program.

Increasing the number of PACT sailors appears desirable in the macro cost-effectiveness sense; however, our analysis finds that PACTs and GENDETs do not necessarily produce as much undesignated work as billet manning may desire. The recent change to the PACT program, setting a minimum TOB, may increase the amount of undesignated work produced, but this change was not tested in our models.

In our optimization model, we examined a 4-year contract for A-PACT sailors accessed as EIs, holding these sailors as A-PACT throughout their entire first enlistments. We used these criteria to mirror those in the proposed NAE OFRP A-PACT pilot. We found that rated sailors are more expensive than A-PACT sailors before their reenlistment because of higher recruitment and training costs. This implies that, to minimize cost, undesignated work should be performed by A-PACT

sailors. If A-PACT sailors' subsequent reenlistment is suppressed, however, it may be better to have rated sailors performing this undesignated work to ensure that future billet demand is satisfied on reenlistment. So, while the A-PACT sailors will satisfy the undesignated work demand, the Navy incurs the recruitment, training, and deployed cost of A-PACT sailors without the benefit of those sailors satisfying future demand (E4 and above). This future demand will need to be met by recruiting more rated sailors who come with a steeper price tag. Our analysis found that it is in the best interest of the Navy to have A-PACT sailors perform undesignated work while allowing those sailors to reenlist in the Navy to satisfy the future demand for rated work.

In conclusion, even though the undesignated workload requirement has decreased as Navy policy and manning constructs have changed, it remains a key part of the Navy's workload. Although there are still issues with the program, PACT is an improvement over past programs. PACT sailors provide the Navy with a reliable workforce at a reduced cost from their rated counterparts. Improvements in the program and its execution could garner increased undesignated work production of PACT sailors. Going forward, the Navy should look to improve program execution, tighten controls within the MRD process, and stabilize the demand. Once these issues are addressed, the Navy could consider exploiting PACT cost-effectiveness by expanding the program by increasing the amount of E1-E3 workload that is assigned to PACTs.

Recommendations

The changes in undesignated work requirements (demand) create instability in the program and make future forecasts of workload difficult for Navy planners. Therefore, it is recommended that the Navy look to tighten the MRD process, set ceilings and floors for PACT planning, and put in place controls to prevent REQ and BA creep. TYCOMs should work with NAVMAC to set specific undesignated work ceilings and floors for ship classes and squadrons.

During our analysis, we found that undesignated sailors normally rated at 14 months, regardless of the program. Yet the Navy's PACT program currently sets the refresh metric to 18 months. We recommend that the Navy develop an optimization model to determine the optimal TOB minimum to produce maximum unrated work using the PACT program levers as input variables.

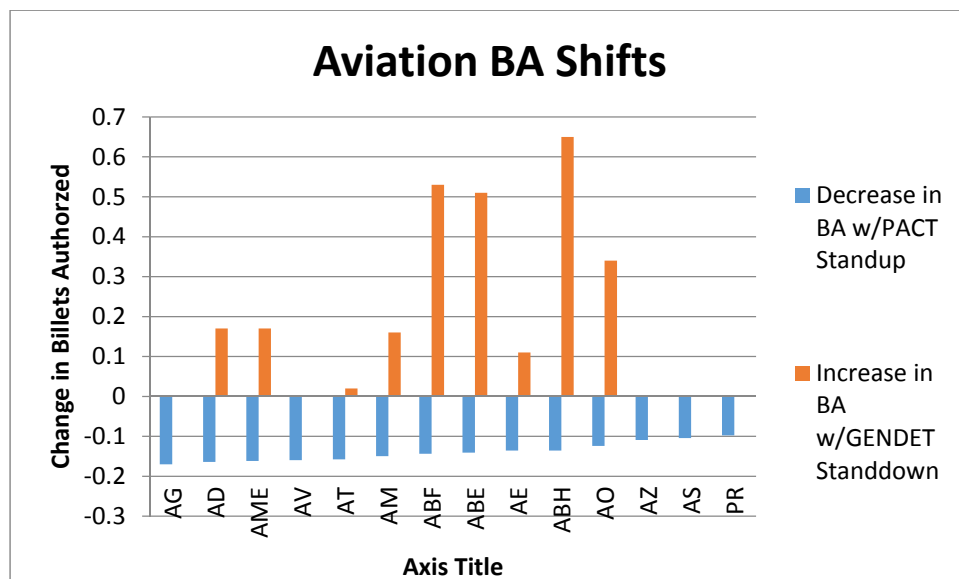
We did not model the cost of training pushed to the fleet in support of the PACT program. During our review of the undesignated work programs, we found this was a common critique from the fleet—more so under the PACT program, which allows sailors to pursue up to 11 ratings in their PACT pipeline and to request pipeline conversion if desired. Before any expansion of the program, analysis should be conducted on the opportunity cost of the PACT program with respect to readiness.

As the PACT program continues to grow, more OJT and UI requirements are levied on ship's crew, increasing workload for rated sailors that is not measured currently by NAVMAC's NRMS process. In light of the proposed Sailor 2025 program RRL, which also pushes training requirements to the fleet, identifying the cost of this work is crucial. We recommend that the Navy use the PACT program to measure this type workload and assess the effectiveness of delayed rate training and the costs to the fleet to execute.

Appendix A: Flow of BA During GENDET Program Transitions

During these transitions, the flow of BA into and out of aviation ratings was not uniform. As Figure 31 shows, the flow of BA into select aviation ratings during the standdown of the GENDET program was significant, with ratings such as ABH realizing as much as a 65-percent gain. This was not the case when BA was moved out of those ratings to create PACT BA. Aviation planners tried to keep PACT requirements between 10 and 15 percent of the total E1-E4 (apprentice) BA for ratings selected for PACT-in quotas. This equates to approximately 2,300 A-PACT requirements.

Figure 31. AN BA shifts



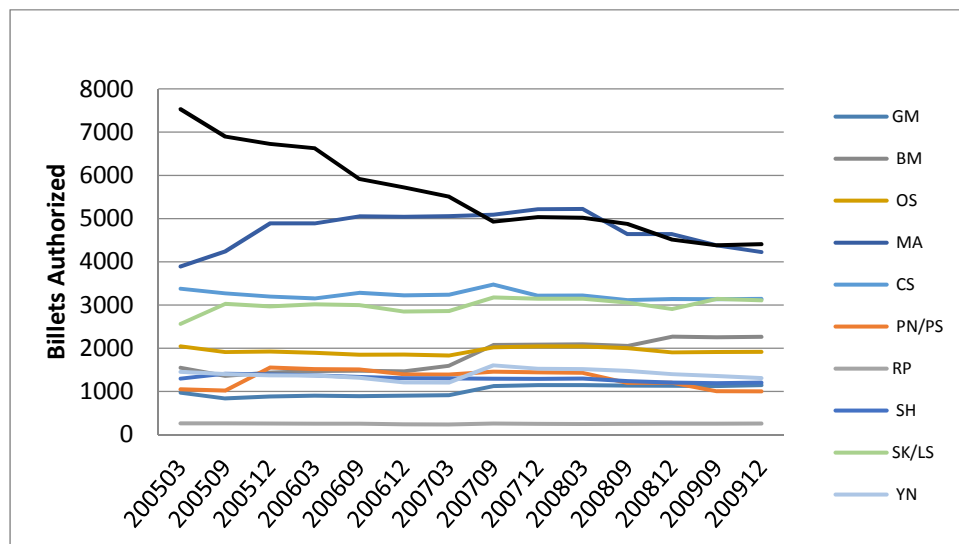
Source: TFMMS data.

Although not all of the BA increase and/or decrease during this time period can be directly attributed to these two events, records show that the proportionality of the increase and/or decrease is consistent. The number of ratings targeted for PACT-in quotas and subsequent rated BA decreases grew from the GENDET ratings from 8 to

11 select ratings. This growth can be attributed to the change in the program intentions and the goal of the PACT program to expand opportunity for PACT sailors to more ratings. During these time periods, other aviation ratings experienced gains and losses due to several causal factors (aviation buys/standdowns, rating mergers, downsizing, etc.); however, only the ratings in Figure 31 have BA changes that can be isolated and traced directly to the GENDET and PACT transitions.

It is harder to isolate the BA changes for both Seaman (SN) and Enginemen (FN). SN BA was reduced during the GENDET standdown, but authorizations never went down to zero as AN did. As shown in Figure 32, as SN BA went down from 2005 through 2007, there were gradual increases in most of the surface ratings depicted in chart, specifically from 2006 to 2007. The rating that initially gained BA at the expense of GENDET BA in 2005 was the Master at Arms (MA) rating, which had an increase of 1,151 billets. The standup of the S-PACT program saw very little movement in surface rated BA; basically, former GENDET BA was designated as S-PACT.

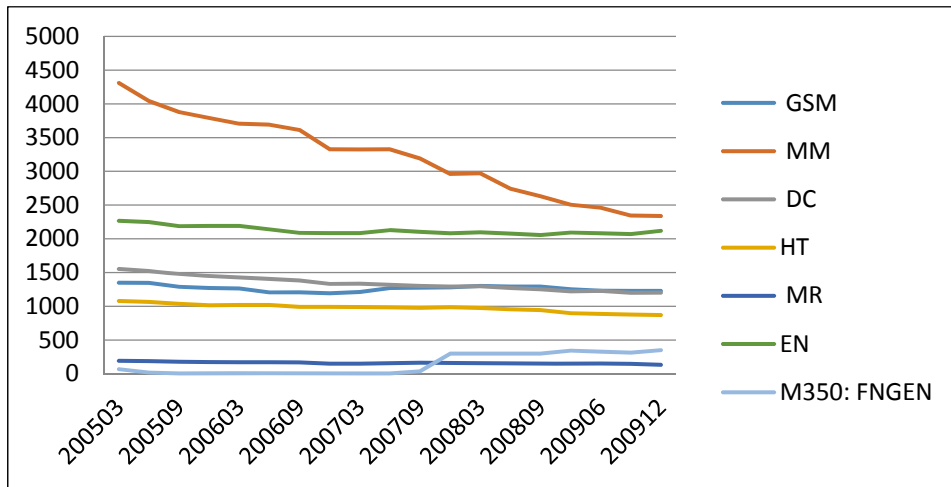
Figure 32. SN BA shifts



Source: TFMMS data.

FN BA did decrease; however, as the BA were only 67 billets to begin with, it is difficult to trace the effects across the likely EN core ratings. During the PACT standup, the E-PACT BA increased to 397 billets, while BA across the FN core ratings depicted in Figure 33 decreased. As with the aviation ratings, there were other causal factors that contributed to the fluctuation of BA for these ratings and other surface ratings over this time period. However, the timing of the billet BA shifts from 2005 through 2009—coupled with historical record of ECMs—makes it clear that these ratings were used to allocate resources to stand up E-PACT BA.

Figure 33. FN BA shifts



Source: TFMMS data.

Overall, the SME working groups that were stood up for several weeks during both these policy transitions did a good job identifying the BA to assign to rated requirements or to reassign back to unrated requirements. However, it is important to understand that the actions of the working group in support of Navy policy changes took place outside the scope of the normal manpower requirements determination process.

This ebb and flow of BA in and out of PACT ratings is important to understand because it helps to identify where the fleet and TYCOMs think the preponderance of the undesignated work resides. So, when policy shifts, they target those ratings they believe will have the least impact to accomplishing the undesignated work, as well as the associated rated work.

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